



Friedr. Welverich



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DIRECTIONS TO THE BINDER.

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THE
JOURNAL OF BOTANY,
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FRIEDRICH WELWITSCH.

A STRIKING and familiar figure for some years past in the scientific circles of London has passed off the stage in the person of Dr. Welwitsch. Tall and strongly built, but bearing evident traces of the continued attacks of tropical diseases, and supporting his rather halting steps with a thick stick, he had much the look of some old military veteran, with which character his countenance was quite in keeping. And truly he had fought a good fight in the tropics of Africa for seven years against fever, scurvy, and dysentery, when exploring as a naturalist the dense steaming forests of the interior, or slowly wandering under the vertical sun over the marshy or sandy plains of the coast of Angola.

In London his life was a very industrious one, and his habits all subordinated to his scientific work. He rose at five or six, and after a cup of coffee would study till breakfast at about eleven, after which he settled down to steady work till the evening, when he went out to dine at one of the foreign restaurants, returning to his work again which generally continued far into the early morning. He took little food and very little sleep, and though constantly suffering always kept up this routine. Few men ever worked more assiduously, and though comparatively little of his labours have seen the light, all is characterised by that precision and completeness which are only found in the work of those who, not anxious to write much, are determined that what they do shall require no undoing by those who follow them. As a botanist he undoubtedly ranks very high, as his knowledge extended over the whole vegetable kingdom, and embraced far more than the mere technical description of species. In this country he was probably underrated, from his difficulty in expressing his ideas clearly in English; but those who could converse much with him were impressed with the wealth of his memory and the precision and extensive range of his information about all departments of Botany. As a zoologist his attainments were also very great, and he had paid especial attention to Coleoptera and Hymenoptera. His scientific abilities have been recognised in the bestowal of four or five orders, he was made a member of the Leopoldo-Corolinian Academy under the very appropriate cognomen of "Brotero," and was a Fellow of the Linnean Society, of the Zoologico-Botanical Society of Vienna, &c.

The exact date of the birth of Friedrich Welwitsch has not been ascertained, but it was in the year 1807. He was one of a large family, his father being the owner of an extensive farm, and surveyor

of a district in Carinthia, in the Austrian Empire. It was from accompanying his father in his walks over the country that, when quite a boy, Welwitsch acquired his first taste for Botany. His earliest scientific remembrance was distinguishing a snowdrop from some species of *Leucoium* in the spring. He carried his taste with him to school, and used to bring home with him in the holidays the plants he had found. His father encouraged him, and used to help him to make out the names of his discoveries by means of an old herbal. On one occasion a plant was brought back which puzzled them all—a great mass of trefoil uniformly with four leaflets, about which their book was quite silent. It was not till years after, that Welwitsch knew it as *Marsilea quadrifoliata*. An apothecary in the town (? Klagenfurt) also assisted him in his early botanical studies.

In due course he was sent to the University of Vienna, being intended for the legal profession. But the irresistible tendency towards Natural Science drew him from the Law, and he made no progress. His father in his displeasure withdrew the allowance from the young student, who was then left to himself, and is said to have for a time supported himself by writing critiques on the theatres. With a view to a more congenial living, however, Welwitsch entered the Medical Faculty of the University, and at the same time pursued Botany with increased assiduity. His first publication was "Observations on the Cryptogamic Flora of Lower Austria," published in the "Beitrage zur Landeskunde," of Vienna for 1834, which obtained a prize offered by the mayor of the city. Somewhere about this period he was employed by the Government to report on the cholera in Savoy, and this mark of confidence reconciled his father to his change of profession. For a while Welwitsch travelled with a nobleman as tutor, and then returned to Vienna to complete his studies. In due course he graduated in Medicine, his thesis being "A Synopsis of the *Nostochineæ* of Lower Austria," printed in 1836. At this time he was intimate with Fenzl and other Austrian botanists, and spent much of his time in the Botanical Museum at Vienna. After another period of tutorship, his course in life began to shape itself. After attending a meeting of the German Naturalists' Association—the model of our British Association—at which the elder Reichenbach was president, his mind became fixed on foreign travel, and an opportunity soon offered itself to put his wishes into execution.

In the year 1839 Dr. Welwitsch was commissioned by the Unio Itineraria of Würtemberg, of which he was a member, to explore and collect the plants of the Azores and Cap de Verd Islands. He accordingly left Vienna in the summer of that year, and came to England, whence he sailed at once for his destination. In July he arrived at Lisbon, where he found himself unavoidably detained; he therefore employed the time in collecting the plants of the neighbourhood, and quickly formed an extensive collection.* He seems to have taken a great liking for the country, and ultimately made arrangements for remaining in Portugal through the winter instead of proceeding to the Atlantic islands. In six weeks he acquired a good knowledge of the

* See a letter to Mr. Pamplin, the London agent for the Unio Itineraria, in Hooker's "London Journal of Botany" ii., p. 119.

Portuguese language, and then more thoroughly devoted himself to the investigation of the flora of the country, visiting the Serras de Cintra, d'Arrabida, &c. He never returned to Austria, nor indeed left the country of his adoption till 1853, except for short visits to Paris and London. During this period he had the care, at different times, of the Botanic Gardens of Lisbon and Coimbra, and was superintendent of the Duke of Palmella's gardens at Cintra and in Alemtejo, as well as having the general supervision of the Duke's gardens throughout Portugal. He also explored a great part of the kingdom, and made very large collections. No less than 56,000 specimens were sent to the Unio Itineraria for distribution, and complete series were deposited in the herbaria of the Academy of Sciences at Lisbon and at Paris. His own private herbarium of Portuguese plants contains more than 9000 species, each represented by a large series of well-preserved examples selected to show all stages and conditions of the species, with the tickets furnished in many cases with careful descriptions and synonymy. In August, 1841, Dr. Welwitsch had the pleasure of meeting Robert Brown, who accompanied him for a three days' excursion to the Valle de Zebro. The remembrance of this was always pleasant to Dr. Welwitsch, who used to show with satisfaction a pocket lens which the great English botanist had given him on the occasion. In 1847 and 1848 Algarvia, the southernmost province of the kingdom, which had been very little known to botanists, was explored. Dr. Welwitsch had for his companion in this journey the young Count Descayrac.

The lower plants were always the objects of Dr. Welwitsch's special study. In the neighbourhood of Lisbon, in the years 1847-52, he added 250 of the larger Fungi to those enumerated in Brotero's "Flora"; and in his zeal after Algæ, in which he found the Tagus very rich, he was accustomed to spend hours "up to his waist in water" day after day. In the second volume of the "Actas" of the Lisbon Academy (1850) he published the "Genera Phycearum Lusitanæ," and other results of his work in the Cryptogamia were published in 1853 in an "Enumeration of the Musci and Hepaticæ collected in Portugal in 1842-50 by Dr. Welwitsch," by Mr. Mitten, and in "Notes on the Fungi," by the Rev. M. J. Berkeley. He himself published little else on Portuguese plants—a very short note in the "Flora" for 1849 (p. 528) on a few semi-tropical forms apparently indigenous to the country; a paper on Oaks (Carvalho) of Portugal, printed in 1861 (in the Portuguese language); and some notes on "The Bryology of Portugal," in the last volume of this journal (p. 184), which was also his latest contribution to science (June, 1872), being all that I can discover. His working copy of Brotero's "Flora Lusitanica" is, however, filled with valuable notes and additions, and must form, with his magnificent herbarium, the foundation of any national Flora—a work very much needed, and which would probably add a number of species to the European flora, besides throwing considerable light on the relationships of the extreme south-west of Europe with the countries to the north, the Atlantic islands, and North Africa respectively. It is therefore to be hoped that Dr. Welwitsch's valuable material will be made full use of by the author of the contemplated new Flora of

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Portugal, which has been recently announced. In 1851 a large number (12,000 Phanerogams and 6,000 Cryptogams) of specimens were sent to Mr. Pamplin—who had been Dr. Welwitsch's agent ever since his first arrival in Portugal—for sale, and more or less incomplete series are now to be found in the British Museum and other herbaria. Besides his botanical investigations, Dr. Welwitsch devoted considerable time to the mollusca and insects of Portugal, and formed large collections.

It was in 1850 that the Government of Queen Dona Maria first resolved to explore the Portuguese possessions on the West Coast of Africa, with the double object of obtaining scientific information on the products of the country and of forwarding its material interests. The project was laid before the Cortès in that year, and received the Royal assent. The next year was that of the Great Exhibition in London; and Dr. Welwitsch, whose abilities and scientific acquirements had now become generally known and appreciated throughout Portugal, was engaged to prepare the contributions of that country. King Don Fernando, who in many respects resembled his cousin the lamented Prince Consort, was himself a man of considerable scientific attainments, and was most active in forwarding the proposed expedition to Angola. He himself planned a scheme, the execution of which he entrusted to one or two of his Ministers who comprehended and sympathised with his earnest desires for national progress and the prosperity of the colonies. The King himself arranged all details, prepared instructions, and put the whole in motion. For carrying out the scientific part of his scheme, the King saw in Dr. Welwitsch the very man required for so difficult and dangerous an undertaking. He had been so long in Portugal that his feelings were fully enlisted in the welfare and honour of his adopted country; a man of liberal culture and education, and a good linguist, he had proved himself a profound naturalist, and yet an admirable collector, and his administrative abilities had been shown in his conduct of the gardens under his care. Dr. Welwitsch was accordingly selected, and in 1851 proceeded to London to make preparations for his voyage, for which purpose the King gave him an autograph letter of introduction to the Prince Consort. After some months spent here, during which he received most valuable advice as to botanical travelling from Robert Brown and other botanists, he returned to Lisbon, and it was not until August, 1853, that he started on his important mission, fully equipped, accredited with full powers by the home Government, and with complete liberty of action. How well the King had chosen was abundantly proved in the next seven years, during which Dr. Welwitsch showed an amount of enthusiasm, perseverance, and endurance of hardships which could scarcely be surpassed. The following account of his travels in Western Tropical Africa is mainly derived from Dr. Welwitsch's "*Apontamentos*," his published letters, and the introduction to Morelet's "*Memoir on the Land and Fresh-Water Shells*," collected during the expedition—which had the benefit of Dr. Welwitsch's supervision.

On the voyage from Lisbon, the traveller had the opportunity of seeing Madeira, the Cape Verds, S. Iago, Prince's Island, and Sierra Leone; at Freetown, in the latter district, he stayed nine days in

September, and first became acquainted with a thoroughly tropical vegetation. He reached Loanda, the capital of Angola, in the beginning of October, 1853, and making that town the base of his operations, he at once undertook excursions in every direction, collecting plants especially, but also Hymenoptera, beetles, and other insects, as well as Mollusca, and the higher animals. His attention was naturally first directed to the country near the coast, which he carefully explored from the mouth of the Quizembo, a little to the north of Ambriz (about 8 deg. S.), to the mouth of the Cuanza (about 9 deg. 30 min. S.). His first impressions of the flora of this district will be found in a letter to Mr. Kippist, dated March 2, 1854, printed in the "Proceedings of the Linn. Soc.," vol ii., p. 327. He devoted nearly a year to the thorough investigation of this maritime zone, and then started for the interior, following the course of the Bengo. Having reached the district of Golungo-Alto, he fixed himself at a place in its centre, about 125 miles from the coast, and situated in a mountainous region, called Sange, whence he made expeditions, often extended to great distances. Two years were spent here in these arduous explorations through almost impenetrable forests, during which Dr. Welwitsch suffered repeatedly and severely from endemic fevers, scurvy, and ulcerated legs, the usual concomitants of African travel; but he never abandoned his work. It was during his residence at Sange that Dr. Welwitsch made the acquaintance of Dr. Livingstone, then (October, 1854) on his way to Loanda, having travelled the whole distance from Cape Town. The two travellers lived together for some time, and the meeting had the effect of determining Dr. Welwitsch on relinquishing an idea he had previously entertained of endeavouring to make his way across the continent to the Portuguese possessions on the East Coast—a task which, as is well known, Livingstone successfully accomplished during the two following years.

In 1856 Dr. Welwitsch left Golungo-Alto, and travelling southwest through the district of Ambaca, which he found full of novelties, reached that of Pungo-Andongo in October. Of this stage of his explorations he has given a graphic sketch in the first number of Mr. Andrew Murray's "Journal of Travel and Natural History," in a paper on the "Black Rocks" of the district, from which it received its old name of the Presidio das *Pedras negras*. The annual blackening after each rainy season of these masses of gneiss, 300 to 600 feet in height, he found to be caused by the immense increase and spread downwards of a minute filamentous alga (*Scytonema chorographicum*) existing in ponds at the summit. The flora of this "beautiful secluded El Dorado" is described in glowing terms by the traveller. "I should call Pungo-Andongo a botanical garden, in form of an extensive park, in which are found the most interesting treasures of vegetation, from the various districts of tropical and sub-tropical Africa, judiciously grouped together, with a considerable number of forms of vegetation quite peculiar to itself."*

Making this paradise a centre, he passed eight months in travers-

* It was here that *Rhipsalis Cassytha*, Gärtn., the only Cactacea hitherto found out of America, was discovered.

ing the district in every direction, crossing the singular range of Pedras de Guinga, the banks of the Lombe and the Cuige, and penetrating as far as the charming islands of Calemba, in the Cuanza, and the immense forests which stretch from Quisonde to Condo, near the cataracts of the river Cuanza. This point, about 250 miles from the coast, was the farthest to the east which was reached. On his way back to Pungo-Andongo, Dr. Welwitsch visited the salt-lakes of Quitage and the magnificent forests on the right banks of the Cuanza, and during a short stay at Pungo-Andongo explored the woods beyond the Rio Luxillo, and in the direction of Cambambe. After this he returned to his old station of Golungo-Alto, intending to explore the banks of the Rio Lucala and region of Duque de Bragança to the eastwards; but on the first night of the expedition, he was deserted by half his men, and the remainder refused to advance. To his great regret he was therefore obliged to abandon the enterprise, and return to Sange, where he devoted several weeks to the arrangement of his collections. Thence he travelled back to Loanda, reaching it in August, 1857, having completed three years of unaided explorations.

Up to this time the territory explored by Dr. Welwitsch comprised a triangle, of which the base, of about 120 geographical miles, occupied the coast, whilst the apex was the point already mentioned at Quisonde, on the right bank of the Cuanza. During his period of illness and forced inaction at Loanda, he corresponded with botanists,* and (in June, 1858) drew up a valuable record of his travels, in the form of a *Mappa Phyto-geographica*, or tabular view of his botanical collections. This was published at Lisbon, under the title of "*Apontamentos Phyto-geographicos sobre a Flora da Provincia de Angola na Africa Equinocial*," in the "*Annaes do Conselho Ultramarino*" for December, 1858. From this paper of sixty-six closely printed pages, we learn that he had, during his three years of travel, collected and arranged 3227 species of plants (to which 510 were afterwards added) in Angola proper. Under each family is given the whole number of species collected, followed, in columns, by the number in each of the three regions, littoral, montane, and high tableland, into which for scientific purposes he divided the country. This is followed by lists of the cultivated plants in each family, and notes on the distribution and most characteristic species found. Many new species are first mentioned or described in the appendix which concludes this concise but comprehensive treatise.

Successful as had been the scientific results of these travels, they had been attained only at the price of shattered health, and rest was absolutely necessary. A short trip to the district of Libongo, north of Loanda, was the only journey made till June, 1859, when his health having been somewhat restored, though still suffering from fever, Dr. Welwitsch recommenced his explorations in another direction. His intention was to investigate the littoral region of Benguela and Mossamedes only, but his travels, fortunately for science, extended over a greater extent of country. After a short

* Two valuable letters on the vegetation of Angola, addressed to Mr. W. W. Saunders, are printed in the *Linn. Society's Journal*, vol. iii., p. 150.

time passed at Benguela, in Lat. 12 deg. 30 min. S., he proceeded by sea to Mossamedes (Little Fish Bay, Lat. 15 deg. S.), where the magnificent climate speedily recovered him, and he gradually extended his journeys, first along the coast as far south as Cape Negro, the port of Pinda, and the Bay of Tigers (Lat. 17 deg. S.), and afterwards as the spring (October) approached, inland to the elevated plateau called Huilla, about 80 miles from the coast, which rises to the height of from about 5800 to 6000 feet above the sea-level. A short sketch of the vegetation of the coast region is given in a published letter to Dr. Hooker (Journ. Linn. Society, vol. v., p. 182) written after Dr. Welwitsch's return to Loanda. The remarkable differences between its flora and that of the coast of Angola proper are very striking even at Benguela, and at Mossamedes an entirely new littoral vegetation appeared. Here he found "a motley mixture of various floras, with a prevailing correspondence to those of Senegambia and the Cape of Good Hope. . . . At a distance of a mile from the coast, however, the forms characteristic of the Cape flora are lost; the vegetation becomes with every step richer in purely tropical forms, which are especially developed on the banks of the Béro, in a variety one would never have imagined in so apparently dry a coast region." Farther south this dryness becomes more and more excessive and the flora poorer and poorer, chiefly consisting of *Euphorbiæ*. As Cape Negro (Lat. 15 deg. 40 min. S.) is approached, the coast rises to form a perfectly level plateau, of about 3000 or 4000 feet in height, and extending over six miles into the country, composed of a calcareous tufa scattered over with loose sandstone-shingle. The vegetation on this arid waste is scanty enough, but it was here that Dr. Welwitsch discovered that remarkable plant which has rendered his name familiar to every botanist, and has formed the subject of a fine memoir by Dr. Hooker, (Linn. Soc. Trans., vol. xxiv., 1863)—the *Welwitschia mirabilis*,* since found in very similar country by Baines and Anderson in Damara Land, near Walfisch Bay, some 500 miles south of Cape Negro. Of this plant Dr. Hooker says in the memoir above mentioned, it is "one that I do not hesitate to consider the most wonderful, in a botanical point of view, that has been brought to light during the present century." The sensations of the enthusiastic discoverer when he first realised the extraordinary character of the plant he had found were, as he has said, so overwhelming that he could do nothing but kneel down on the burning soil and gaze at it, half in fear lest a touch should prove it a figment of the imagination.

But the vegetation of the highlands of Huilla, though bringing to light no such wonder as the *Welwitschia*, produced quite as strong an impression on the mind of the traveller. He started from Mossamedes at the beginning of October, and following the banks of the Rio Mayombo, reached Bumbo, on the slopes of the Serra de Chella, and crossing that chain at a height of about 4200 feet, found himself on the tableland at the end of the month. "The entire appearance of the landscape, the aspect of forest and plain—indeed, the whole character of the vegetation, was at once and entirely changed as though

* Reichenbach's Polemoniaceous genus *Welwitschia* (1837) was reduced to *Gilia* by Bentham. (See DC. Prod. ix., p. 310.)

by magic. I fancied myself in a strange world. Everything about me would recall the delightful outlying mountains of Switzerland, did not numerous *Melastomaceæ*, *Apocynaceæ*, *Combretaceæ*, &c., remind me of the tropics."—(Letter to Hooker, *l.c.*) The intermingling of tropical, Cape, and European forms is indeed very striking in the extensive and beautiful flora of this mountainous country, watered with innumerable streams running to the south to join the Cacolovar, which flows into the Cunene, and covered with pasture-lands always green and fresh; and the seven months spent in the district produced a very large addition to the flora of West Tropical Africa. A concise and interesting account of the botany of Huilla, which—like that of the mountains of the Bight of Biafra, since so successfully investigated by G. Mann—bears a strong similarity to that of Abyssinia, is given in a letter to M. De Candolle, written by Dr. Welwitsch after his return to Portugal, and published in the "Bibliothèque Universelle de Genève" for July, 1861, with remarks by M. De Candolle.

Over 2000 species were collected in the province of Benguela by Dr. Welwitsch, whose investigations in this attractive country were unceremoniously put an end to by a native war. The little colony of Lopollo in Huilla, founded about three years previously, was attacked by a large force of Munanos to the number of 15,000. They held it closely blockaded for two months, during which the little garrison, of which Dr. Welwitsch was a member, kept them bravely at bay, until they at length gave up the siege and contented themselves with carrying off all the flocks they could find and dispersing among the mountains. After this Dr. Welwitsch recrossed the Serra de Chella, and returned to Mossamedes and Loanda, whence, wounded and stricken with fever and dysentery, he embarked for Lisbon with his immense collections, arriving in the Tagus in January, 1861.

His herbarium, with which we have chiefly to do, is undoubtedly the best and most extensive ever collected in Tropical Africa, whether we look to the intrinsic interest of the plants themselves, the care and judgment displayed in their selection and preservation, or the extent of the collection both in number of species and series of specimens. The botanists who have had the opportunity of working with Dr. Welwitsch's materials universally bear witness to their completeness and excellent conservation, added to which he was in the habit of (in most cases) carefully describing their essential characters when gathered, so that his tickets convey an amount of information scarcely ever to be found in such collections, which have been usually formed by travellers more or less ignorant of botanical science. No exploration ever more conclusively proved the importance of entrusting investigations of new countries to trained botanists and men of general and extended culture, instead of, as is usually the case, to mere uneducated collectors, than the voyage of Dr. Welwitsch. The importance of his herbarium may be judged of from what Professor Oliver says in the preface to the Flora of Tropical Africa, "For our material from Lower Guinea we are almost wholly indebted to the courtesy of Dr. Friedrich Welwitsch, who, with rare liberality, has freely granted us the opportunity of inspecting his collections, which, in respect of judicious selection and admirable preservation, are without rival. His carefully accurate notes upon the fresh plants have

also been at our service." Of this Flora two volumes have been published, and upon every page the services of Dr. Welwitsch to science are conspicuous. In many genera, species after species is known from his material only, and in numerous other cases his excellent specimens and notes afforded the descriptions and enabled inferior specimens from other collectors to be referred to their true systematic position. The Natural Orders (some twenty-three in number) which were elaborated without the benefit of Dr. Welwitsch's collections have evidently greatly suffered from the want.

After his return to Portugal, he commenced the more critical examination of his African herbarium; but in the absence of collections, books, and qualified men in Lisbon, little could be done towards naming and arranging them. It was, indeed, absolutely necessary to proceed to one of the great scientific centres, and London was selected. After a visit to the International Exhibition of 1862, Dr. Welwitsch returned to Lisbon, and commenced the removal of the greater part of his collections, with which, in the next year, 1863, he arrived in London; the Portuguese Government having arranged that for the superintendence of the work of examining, naming, and publishing the plants, and to defray the attendant expenses, Dr. Welwitsch should receive a regular grant which he considered sufficient.

He at once set to his work, and also entered into various arrangements with societies and individuals for engraving plates and publishing descriptions; but hardly had two years passed when, to use his own words in the instructions to his executors, "a false and calumnious attack was made upon me in the Portuguese House of Parliament. Some one asserted that I was selling the Angolan collections and living in splendour on the proceeds," and "without the slightest inquiry, and in the absence not only of all proof, but of any attempt to procure proof, on the mere *ipse dixit* of a reckless accuser, I was condemned unheard, and the first and last intimation that I received of the matter from them was a curt notice that did not reach me till six months after the attack, that my subsidium had been cut off . . . I have been left to proceed with my work in London without the slightest allowance or remuneration, and have had to pay out of my own means the expenses of my various publications, to which on the faith of my promised subsidium I had committed myself; and when I have sent to the Portuguese Government copies of my works, I have never been gratified by the smallest expression of approval, or with any recognition of my self-sacrifice and devotion."

It is only proper to put these facts on record, as they afford a clue to much of Dr. Welwitsch's conduct and character during the last few years of his life in London. Not that he ever withdrew his hand from his work. He worked at his collections without intermission from early morning till late at night, in spite of frequent fevers and other reminders of his tropical life, and was indefatigable in keeping himself *au courant* with all that was published in botanical and entomological science, and naming and arranging his collections in accordance; but he felt deeply the unworthy conduct of the Government of the country in whose service he had sacrificed the best part of his life, and he became suspicious and averse to society. With the exception of a visit to Paris in 1867, in connection with the

Exhibition there, for which he prepared the catalogue of the industrial products of the Portuguese section (in which will be found a great amount of previously unpublished matter), he has lived constantly in London, alone and absorbed in his work, in spite of ill-health sufficient to have caused most men to seek rest and quiet. It was not, however, till the summer of 1872 that there was any reason for anxiety. A fire at that time in the house where he lodged, and the narrow escape of his collections, which were scorched and blackened by the smoke, produced a severe nervous shock, and soon after he became seriously ill. It soon became evident that his disease was a fatal one; nevertheless, he continued to work, and the singular strength of his constitution was exceedingly striking, but at last he was obliged to give up, and after a painful illness of about six weeks, during which he was cheered by the visits of some of his London botanical friends, he died on the evening of the 20th October. The funeral at Kensal Green on the 24th was attended by a number of scientific men and a representative of Portugal.

Besides the memoirs and papers already mentioned on African Botany, Dr. Welwitsch, since his residence in London, published several others, the most important of which is the *Sertum Angolense* in the "Trans. Linn. Soc.," vol. xxvii. (1869), with twenty-five plates by Fitch. In this elaborate communication a number of the most interesting species are carefully and fully described, twelve new genera are founded, and forty-eight new species, and in the introduction is a succinct account (in Latin) of the geography and climate of Angola and Benguela.

There are also two papers in the "Journal of the Linn. Soc.," "On a remarkable Species of *Cissus* from the South of Benguela, &c., &c." (viii., p. 75), and "Observations on the Origin and Geographical Distribution of Gum Copal in Angola" (ix., p. 287), and a paper on African *Loranthaceæ* in the "Gardener's Chronicle" for July 1st, 1871. In conjunction with Mr. Currey he published the first part of *Fungi Angolenses* (Trans. Linn. Soc., vol. xxvi., p. 279), containing a number of new species.

Though he is thus seen to have been himself far from what is called a publishing botanist, his collections have been the foundation of a number of monographs and memoirs by various authors. The "Flora of Tropical Africa" has been already mentioned, as well as the account of *Welwitschia* by Dr. Hooker. Besides these A. De Candolle has monographed the *Campanulaceæ* in the Ann. des Sc. Nat.; and Oliver the *Lentibulariaceæ* in the Journ. Linn. Soc., ix., p. 144. In our pages (vols. ii. and iii.), under the title of *Welwitschii Iter Angolense*, the *Euphorbiaceæ*, *Hederaceæ*, *Bignoniaceæ*, *Aroideæ*, and *Lemnaceæ*, have formed the subject of a series of papers by J. Müller, Seemann, Schott, and Hegelmaier, and there are isolated notices of other Angolan plants scattered through botanical literature. In the Cryptogams, Duby has carefully monographed the Mosses in the Memoirs of the Natural History Society of Geneva for 1870-71, and Nylander has given an account of the Lichens in the "Bull. Soc. Linnéenne de Normandie" for 1869.

The great importance of the African collections renders it a subject for unmixed satisfaction that the collector's own complete

series of them will, there is every reason to believe, be retained in this country, Dr. Welwitsch having by will directed it to be offered at a fixed price to the British Museum. Of the sets, he directs the first two to go to the Portuguese Government, and another to the Academy of Lisbon; the remaining sets are given to Dr. Schweinfurth, of Berlin, M. De Candolle, of Geneva, and the Botanical Museums of Berlin, Vienna, Paris, Copenhagen, Rio Janeiro, Carinthia, and Kew; a set of the mosses is given to M. Duby, of Geneva. The distribution of the plants has been entrusted by the executors to Mr. Hiern, who, if necessary, will be assisted by Dr. Schweinfurth, of Berlin; in connection with this it is intended to print for distribution with the sets a named list of the whole collection, including such brief descriptions of, and notes upon the unpublished species as may be practicable and seem necessary. This will also be published in the pages of this Journal. The zoological collections will be treated in a similar manner.

The whole of the general herbarium and the fine Lusitanian collection, as well as all books and instruments, and Dr. Welwitsch's own series of African insects and mollusca, besides all other zoological specimens, are left to the Royal Academy of Sciences and Zoological Museum of Lisbon. Sets of the insects and mollusca are also bequeathed to Dr. Peters, of Berlin, and to the Museum of Carinthia.

In thus making his will in favour of Portugal, Dr. Welwitsch was actuated by the hope that his collections may form the nucleus of a great national collection which will promote the study of Botany in that country; and he has directed that all surplus specimens shall be sold and the proceeds given to the Portuguese Government for the purpose of endowing a conservator. Dr. Welwitsch concludes his "Instructions"—and these are almost literally his last words:—"If any future Government of Portugal shall feel that they owe me and desire to make me any reparation, the way in which they can do so that would be most gratifying to me would be by fostering that herbarium and museum of which I wish now to lay the foundation."

The portrait prefixed to this notice is taken from a photograph by Messrs. Maull and Co., of Piccadilly.

HENRY TRIMEN.

Original Articles.

THE INFLUENCE OF INSECT-AGENCY ON THE DISTRIBUTION OF PLANTS.

BY F. BUCHANAN WHITE, M.D.

IN urging botanists to study the influence that insect-agency has upon the distribution of plants (see vol x., p. 334), Mr. Bennett points out a very interesting subject for investigation, and I trust that the readers of the Journal will not lose sight of it.

If *Sphinx Convolvuli* is the chief agent in the fertilisation of *Convolvulus sepium*, then the reason why that plant seldom in Britain

perfects seed (as is said to be the case) is readily explained. The moth is rare in Britain, and I do not at present remember any record of its having been seen visiting the flowers of *Convolvulus*, though it is generally taken in the act of hovering over flowers, notably *Petunia* and honeysuckle. Though *Sphinx Convolvuli* occurs throughout Britain (even beyond the range of *Convolvulus*, e.g., Orkney), yet it is most especially a southern insect, and perhaps that may account in some measure for the rarity in a wild state (at least in my experience) of *Convolvulus sepium* in Scotland.

Dianthæcia (a genus of night-flying moths) must exert a great influence upon the fertilisation (and consequent abundance) of *Silene* and *Lychnis*. In fact, the perpetuation of the race of these moths depends upon the fertilisation of the plants, since the larvæ feed only upon the unripe seeds. This is a case somewhat similar to, though by no means so extraordinary as, that mentioned by Professor Riley at the last meeting of the American Association for the Advancement of Science. Professor Riley showed how the fertilisation of *Yucca* depended on the agency of a moth, the female of which collects the pollen and places it on the stigma, for the express purpose that the larvæ, produced from the eggs which she deposits on the ovary of the plant, may have a supply of unripe seeds to feed upon. In regard to *Lychnis* and *Silene*, it is possible that if there were no *Dianthæciæ* the plants might be more numerous, since other moths visit the flowers, though the *Dianthæciæ* are the chief visitors. *Silene maritima* is the most frequented species (it is, perhaps, worth remarking that it has also the largest flowers, and is, perhaps, the most numerous in individuals—of course, in proportion to its restricted usually maritime habitat); *Lychnis Flos-cuculi* is more especially visited by *Dianthæcia Cucubali*; and *Silene Otites*, a plant of the eastern counties, by *Dianthæcia irregularis*. On the Continent this insect frequents *Gypsophila paniculata*. I know of no insect visitors to *Silene acaulis* and *Lychnis alpestris*. Possibly, if *Lychnis alpestris* had more insect visitors, it might be more abundant on our mountains, though the peculiarities of the locality (in Forfarshire, at least) have doubtless something to do with its restricted range.

It is probable that insects are the agents in the production of the numerous hybrids that occur between species of the genus *Carduus*, on the flat horizontal top of whose heads various species of *Lepidoptera* may often be seen. The downy bodies of these moths would readily convey pollen from one plant to another, and, when the plants were different species, hybridisation might be the result in a genus the species of which seem so liable to that phenomenon. *Carduus Carolorum*, which is supposed to be a hybrid between *C. palustris* and *C. heterophyllus*, may have been produced by the agency of *Trichius fasciatus* (a beetle belonging to the family *Cetoniadæ*), whose thorax and underside are very shaggy, and which loves to bury its head and shoulders in the head of a thistle. This beetle is rather rare in Britain, but is not uncommon in the district where *Carduus Carolorum* was found.

The species of *Meligethes* (a genus of small beetles) inhabit flowers. M. Brisout, in *L'Abeille* (vol. viii., January, 1872) points out the flowers in which the various species are generally to be found. Among

these are *Genista*, *Galium*, *Prunus spinosa*, *Symphytum officinale*, *Mercurialis perennis*, *Trifolium medium*, *Solanum Dulcamara*, *Melilotus*, *Cynoglossum officinale*, *Lotus* and other *Leguminosæ*, *Lamium album*, *Galeopsis*, *Mentha*, *Marrubium vulgare*, *Nepeta Cataria*, *Ballota nigra*, *Teucrium Scorodonia*, *Salvia* and other *Labiata*. Many species affect only one kind of plant each, and in going from flower to flower cannot fail to carry pollen with them. *Teucrium Scorodonia* is a great favourite with many nocturnal *Lepidoptera*, and this, perhaps, partly accounts for the great number of individuals of this plant. Moths usually abound in places where the *Teucrium* grows.

Many flower-frequenting night moths have more or less strongly developed crests of hairs on the thorax. Many flowers frequented by these moths have blossoms with mouths directed to the horizon (*i.e.*, neither drooping nor facing the zenith), and stamens more or less exserted and ascending; styles also more or less exserted. When a moth visits such a flower it either hovers in front of it and plunges its haustellum into the corolla, or else rests on the flower and does the same. In either case it brushes the stamens with its thorax, and carries off unwittingly a supply of pollen to the next flower visited. Now, it is worth noting that some of the moths which hover (*e.g.*, the *Plusiidae** and *Cucullia*) have very strongly developed thoracic crests, and that some flowers which are especially favourites with them have long exserted ascending stamens and styles (*e.g.* *Echium vulgare* and *Lonicera Periclymenum*). If the stamens in these plants were short, the pollen would have little chance of being brushed off by the thorax of the moth, and it does not readily adhere (as the sticky pollen masses of the orchids do) to the haustellum, and if the thorax of the moth was smooth the pollen would not be so liable to be brushed off, even though the stamens are exserted; whereas with exserted and ascending stamens in the flower and crested thorax in the moth, we have every condition necessary to insure a greater or less quantity of pollen being conveyed from one plant to another. In the *Labiata* the stamens, though so few, seem to be especially arranged in many species, that every chance may be afforded of pollen being carried. In *Ajuga reptans* and *Teucrium Scorodonia* the stamens are exserted and ascending, and are four in number—two long and two shorter. An insect therefore in plunging its head into the corolla would almost necessarily brush all the four stamens. These plants are much visited by moths.

CAMBIUM AND MERISTEM.

By W. R. McNAB, M.D.,

Professor of Botany, Royal College of Science for Ireland.

In considering the structure of stems, it is of primary importance to have definite ideas regarding the tissue which increases by division of its cells, and thus adds to the bulk of the whole. Much obscurity seems to exist regarding this matter, and the present paper may be taken as an attempt to clear up some of the more doubtful points.

* Have also crested heads.

All tissue capable of multiplying by division was described by Schleiden, Schacht, and others as *cambium*. Naegeli* perceived that there was a marked distinction between the cambium of the fibro-vascular bundles and the parenchymatous tissue of which all the organs of higher plants at first consist, and which is capable of dividing. To this form he gave the name *meristem*. Meristem and cambium, according to Naegeli, differ in the form and mode of growth of their cells, in the direction in which they divide, and in the nature of the permanent tissue formed by them. Naegeli, however, called the tissue of the young fibro-vascular bundle cambium, as well as the cells which remain capable of division between the xylem and phloem part of each fibro-vascular bundle. It was to this latter that Sanio† restricted the term cambium, and in this he is followed by Sachs.‡ The latter author distinguishes between the tissue of the young fibro-vascular bundle and the cambium of Sanio, giving to the former the name *procambium*.

Procambium, then, is the tissue of the young fibro-vascular bundle before it becomes differentiated into the various forms of permanent tissue. Cambium, on the other hand, is that zone of tissue between the xylem and phloem part of the fibro-vascular bundles of dicotyledons and archi(=gymno)sperms on which the circumferential growth of the stems mainly depends. The meristem found in the youngest condition of all organs of higher plants may be called *primitive meristem* (urmeristem, Naegeli), to distinguish it from certain portions which remain over after the conversion of the majority of the cells into permanent tissue. This we may simply call meristem (folgemeristem, Naegeli), the meristem bearing to primitive meristem the same relation that cambium does to procambium. Naegeli distinguished between the meristem in the cortical region and the meristem in the medullary rays, applying to the former the term phellogen.

If we take Hanstein's§ researches on the development of the embryo, we find that the embryonic tissues at a very early period become distinguishable into three series; in other words, the primitive meristem differentiates into dermatogen, periblem, and plerom. From the dermatogen the permanent epidermal cells are formed, the trichome mother cells (hairs), and also the chief portion of the pileorhiza of the root. The cells of the periblem and plerom are arranged in rows, and from the periblem the cortical tissues develop, while the plerom forms the pericambium, procambium, and pith. The pericambium, which is a single layer of cells, exists only in roots, and separates the periblem from the plerom—being, in fact, the external layer of the plerom.

The plerom, by further development, gives rise to the fibro-vascular bundles and pith, which we may group together as forming the plerom tissues. The cortical layers—i.e., all between the plerom and epidermis—we may call periblem tissues; and the epidermis, with its appendages, we may consider as dermatogen tissues—a very convenient and at the same time a thoroughly scientific arrangement.

* Beiträge zur Wiss. Botanik, i., p. 2.

† Bot. Zeitung, 1863, p. 362.

‡ Botanische Abhandl., Pt. 1.

§ Lehrbuch, ed. 2, p. 90.

In considering the different forms of stems, it is of the greatest importance to bear in mind the distinctions between meristem and cambium. Thus in a dicotyledon we have *cambium*, and two kinds of *meristem*, all containing cells capable of multiplying by division. There is the phellogen, or cortical meristem, the meristem forming the medullary rays, and the cambium of the fibro-vascular bundles. The phellogen is thus the meristem layer of the periblem tissues, the meristem of the medullary rays that of the plerom. The cambium cylinder of the dicotyledon is thus a compound structure consisting of the cambium of the fibro-vascular bundles and the meristem of the medullary rays (strahlenmeristem, Naegeli), or, in other words, the cambium cylinder so called is made up of the cambium of the fibro-vascular bundles and the plerom meristem. The circumferential growth of the dicotyledon and archisperm depends then on the simultaneous development of new cells in the cambium and meristem, the whole forming a uniform zone, while the bark increases in thickness by the formation of new cells (chiefly cork) by the periblem meristem.

In monocotyledons the procambium does not form cambium, the whole of the tissue forming the permanent cells and vessels of the bundle. In some stems the plerom meristem layer is well developed, as, for example, in *Dracæna*.* In monocotyledons the periblem tissues are but slightly developed. Near the periphery of the stem of *Dracæna*, division of the cells of the plerom meristem may be seen, thus causing the stem to increase in diameter. As in the dicotyledon the plerom meristem forms the procambium strings, from which the fibro-vascular bundles develop, so in *Dracæna* new procambium strings form, and thus both plerom parenchyma (pith) and new fibro-vascular bundles, with their varied forms of tissue, are produced.

In vascular cryptogams no dermatogen forms, the two elements, plerom and periblem, alone existing. The plerom tissues seem early to pass into permanent tissue, no cambium or meristem remaining. The periblem tissues are, however, largely developed. The external layer differentiates into an epidermis with its appendages, while the periblem meristem may be largely developed, as in *Isoetes*, in which circumferential growth is seen to take place.

In the gigantic fossil vascular cryptogams of the Coal period it seems to me that like the recent forms cambium and plerom meristem are wanting, but the periblem meristem was very active, and thus the stems increased greatly in size. To say that this growth is exogenous, meaning that the growth resembles that of a dicotyledon or archisperm, seems a mistake, because it is on the periblem meristem, and not on the cambium and plerom meristem, that the growth depends. In most archisperms, as in the vascular cryptogams, no dermatogen is formed, the primitive meristem differentiating into periblem and plerom only.

Sachs† divides the tissues of plants into three groups—epidermal tissues, fibro-vascular bundles, and primitive tissue (*grundgewebe*). The latter form must be abandoned, because it belongs both to the periblem and plerom, and I believe the most satisfactory divi-

* Sachs' Lehrbuch, ed. 2, p. 103, fig. 90.

† Lehrbuch, ed. 2, p. 74, *et seq.*

sion of tissues will be as I have just indicated into dermatogen, periblem, and plerom tissues, all possessing certain forms of cells in common, as all arise from an originally similar tissue.

NEW FERNS FROM LORD HOWE'S ISLAND.

By J. G. BAKER, F.L.S.

DURING the recent expedition to Lord Howe's Island from Australia to study the eclipse, two interesting new ferns were discovered, of which specimens have been sent to England by Mr. Charles Moore, of Sydney. These are—

TODEA (LEPTOPTERIS) *MOOREI*, *Baker*: frondibus magnis oblongo-deltoides tripinnatifidis, pinnis imbricatis oblongo-lanceolatis, inferioribus centralibus paulo minoribus leviter deflexis, pinnulis lanceolatis, segmentis late ligulatis vel infimis subcuneato-flabellatis apice 3—5 crenatis, venulis in segmentis 3—5.

Lord Howe's Island, summit of Mount Gower.—*Eclipse expedition*, 1871.

Intermediate in cutting between the Australian *T. Fraseri* and New Zealand *T. hymenophylloides*, but larger than either, if the specimen be fairly representative, so that it would be a very effective addition to our series of Ferns in cultivation if living plants could be procured. Caudex and stipe not sent. Frond a foot and a half long by a foot broad, oblong-deltoid, quite similar in texture to the already-known species, both surfaces and rachises quite glabrous and naked. Pinnæ much imbricated, those below the centre of the frond the largest, oblong-lanceolate, half-foot long by two inches broad, all except the lowest spreading horizontally, these latter rather shorter and a little deflexed, as in *hymenophylloides* and *Fraseri*, not distant and dwindling down to a very small size very gradually, as in *superba*. Rachis of the pinnæ winged in the upper third, wingless lower down. Pinnules so close as to be rather imbricated, lanceolate, the most developed an inch long, sessile, nearly equally cuneate or subtruncate at the base, cut down nearly to the midrib into contiguous erecto-patent segments, most of which are strap-shaped, about a line broad, but the lowest subcuneato-flabellate, one-eighth of an inch broad, furnished with 3—5 shallow crenations on the outer border. Sori confined to the vicinity of the midrib in the lower part of the pinnules.

Perhaps I can make it most easily understood that the *extent* of cutting is the same as that of the well-known New Zealand *hymenophylloides*, but that here the whole frond, separate pinnæ, and especially the ternary segments are on a much larger scale, and the shape of the pinnæ and segments quite different. In *hymenophylloides* the pinnæ are lanceolate and about half as broad, and the ternary segments are about a quarter of a line broad, simple, or the lowest rarely forked with a single central vein; whilst in the new species they are from a line to an eighth of an inch broad, containing 3—5 veins, each ending in one of the little terminal crenations.

ASPLENIUM (*DAREA*) *PTERIDOIDES*, *Baker*: stipitibus nudis compressis viridibus, frondibus oblongo-deltoides tripinnatifidis glabris nudis magnitudine mediocribus viridibus crassiusculis, pinnis inferioribus deltoideis basi inæquilateraliter cuneatis superioribus sensim brevioribus, pinnulis rhomboideis sessilibus, dimidio inferiore integris subæqualiter cuneatis, dimidio superiore segmentis paucis brevibus ligulatis obtusis integris ascendentibus instructis, venulis erecto-patentibus in segmentis tertiariis solitariis centralibus, soris simplicibus elongatis (36 lin. longis) submarginalibus, semper extrorsum apertis.

With the preceding.

Caudex not seen. Stipe naked, green, short, compressed. Frond oblongo-deltoid, under a foot long by half a foot broad, tripinnatifid, green, glabrous, naked, rather fleshy in texture. Main rachis green, flattened, naked, winged in the upper half of the frond. Lower pinnae deltoid, the lowest slightly shorter and broader than the two next, distinctly stipitate, $2\frac{1}{2}$ —3 inches long by $1\frac{1}{2}$ —2 inches broad, unequally deltoid-cuneate at the base, sometimes more produced on the lower, sometimes on the upper side, cut down to a narrowly-winged midrib, and in the upper half to a broadly-winged midrib. Upper pinnae sessile lanceolate, most of them simple erecto-patent ligulate truncate. Lowest pinnules rhomboid $\frac{1}{4}$ — $\frac{3}{8}$ of an inch broad, subequally cuneate and quite entire in the lower half, the upper half furnished with several short erecto-patent strap-shaped blunt lobes, of which the lower are forked at the tip, the upper entire. Veining distinct, the erecto-patent venules of the pinnules running up one into the centre of each lobe to its apex. Sori linear, placed only on the outermost venules of the pinnules and reaching to the edge of the lobes, never forked or confluent, those of the lower half of the pinnules reaching half an inch, those of the lobed upper half one quarter of an inch in length. Involucre distinct, persistent, membranous, brownish, glabrous.

A very distinct plant, looking at the first glance more like a *Pteris* than an *Asplenium*. In colour, texture, and cutting it most resembles some of the forms of *Asplenium bulbiferum*, from which it differs totally in its long, always submarginal sori. The truncate ligulate lobes of the upper part of the major divisions are like those of *flaccidum*, but the sori are very different, and the main pinnae are deltoid, not lanceolate, growing much more compound in the lower half. There is an uncut space of 3—4 lines across the centre of the pinnules, which gives it a totally different aspect from that of any *Darea* already known. The sori face outwards, and there is sometimes one on each side of a lobe, and sometimes the sori of two different lobes are contiguous and open out face to face in a way that shows an affinity with *Scolopendrium*, and gives the plant a distinct habit of its own.

The same collection contains what I believe to be a new *Lastrea* near *recedens* and *velutinum*, but the specimen is scarcely full enough to characterise it clearly in a group where the forms approach closely to one another.

SHORT NOTES AND QUERIES.

JERSEY PLANTS.—Mr. Piquet, well known to have an intimate knowledge of Sarnian Botany, has sent two plants of great interest from the west coast of Jersey. *Centaurea paniculata*, L., which was first discovered by him eighteen years ago in very small quantity, he has had the good fortune to rediscover last summer in great abundance. Few botanists have seen specimens from Jersey (see the Floras of Babington, Boswell Syme, and J. D. Hooker). The locality is a very desolate spot north of St. Ouen's Pond, on barren sandy hillsides, where it is so abundant as to render the place literally purple with its flowers. So unpromising did these hills look, that Mr. Piquet had never thought them worth visiting during the many years he has botanised in the island, yet the original locality was at the foot of the very hills where the plant is now so abundant, so that, as he remarks, it is very strange that in the long interval he had never again met with it. He adds, "It appears to me that the plants I discovered eighteen years ago must have come from seeds wafted down by the wind, and that the *Centaurea* has been growing there ever since. The district consists of loose sand, and is far from any cultivated ground; the prevailing plants there are *Matthiola sinuata*, *Sinapis incana*, *Cakile maritima*, *Picris hieracioides*, *Ammophila arundinacea*, *Euphorbia Portlandica*, &c.; *Centaurea Isnardi* is also common there. With *C. paniculata* Mr. Piquet has also forwarded specimens of a *Scabious*, which was found growing with the *Centaurea*. This appears to be *S. maritima*, a plant which has not been, so far as I know, ever recorded in western France, though it occurs in Portugal and throughout the Mediterranean region. The specimens are about three feet high, very upright, and branched, with heads of pale blue scentless flowers, resembling *S. Columbaria*, but smaller. In spite of the flowers, the best authors consider *S. maritima* as specifically the same as the *S. atro-purpurea* so common in gardens, which may be considered as a cultivated race, of which *S. maritima* is the wild original. Taking into consideration the known European range of this plant, and how commonly cultivated is *S. atro-purpurea*, it seems most probable that the Jersey maritime *Scabious* is not truly indigenous there. It is right, however, to say that Mr. Piquet thinks it native, and his experience must be allowed due weight. With reference to *C. paniculata*, there is great room for difference of opinion as to whether it can be indigenous to the Channel Islands, though it is more probably so than *S. maritima*. —HENRY TRIMEN.

MANCHESTER PLANTS (vol. x., p. 376).—I do not see that there is any ground for surprise that a given plant should be plentiful fifteen miles from Manchester, and yet seen nowhere nearer, or so sparingly as scarcely ever to be observed. There are plenty of examples of plants occurring in a meadow upon one side of a watercourse, and being absent from the field on the contrary side, in consequence probably of some considerable difference in the soil. Not far from where

I am writing (Manchester), the brook establishes a boundary so complete along the edge of the clay upon the one hand, and the sandy surface-soil upon the other, that the occupiers of the gardens upon the respective sides know quite well what to provide for, merely by noting upon which side of the water they are situate. Between Manchester and Newton intervenes that vast and dreary expanse of wet moor known as Chat Moss, and it is quite possible that this may operate as some kind of barrier to the community of Florula. Besides, to be fifteen miles off is scarcely to be "near." By "near," when talking of a Florula, I understood much the same area as that of the London Post-office district, the City "and twelve miles round." A piece of country twenty-four miles across from north to south, and from east to west, is plenty for a botanist to consider his local estate. When he travels beyond twelve miles in any direction from home, he is almost sure to enter upon something novel both in the geology and the vegetation. I may add that not only does *Mentha arvensis* occur abundantly near Manchester, but also *Mentha hirsuta*; their names were accidentally omitted in my paper.—LEO GRINDON.

EURHYNCHIMUM PRÆLONGUM (see vol. x., p. 392).—The *Hypnum* or *Eurhynchium prælongum* of the neighbourhood of Oxford, like all that I have seen from other counties, seems identical with the *Hypnum prælongum* of Dillenius, xxxv., 15, A; having interruptedly close-pinnate stems, the leaves of the main stems wide-spreading and squarrose, triangular-cordate, amplexicaul below, suddenly tapering above into narrow points; the leaves of the branches erecto-patent, ovate, or ovato-lanceolate, acuminate; in all points exactly as admirably figured and described in *Bryologia Europæa*, under the name of *E. Stokesii*, Turner. At the same time the description and figures of *E. prælongum* of that work afford a correct representation of *E. Swartzii*, Turner, and it would seem that the authors of that great work have here fallen into an error through non-acquaintance with the Dillenian herbarium. The real *H. Stokesii* of Turner appears little known, but is probably, as far as I am able to make it out, merely a robust state of *H. prælongum*, Dill., growing in damp woods. I have North of England and Irish specimens that seem halfway steps to it, but none that correspond quite to my notions of the real thing.—H. BOSWELL.

MOSSING OF CINCHONA BARKS.—Mr. John Broughton, in a letter to Dr. Hooker, dated Ootacamund, Oct. 24, 1872, says:—"The mossing improves the true bark but slightly on trees that are old enough for barking, and the increase of value will probably not pay the expenses. By taking the bark and allowing it to renew under moss, a great check is given to the growth of the tree, but the bark usually grows again. The second time it is taken the renewal is quite uncertain, and according to my experience the tree is often damaged by the bark not renewing. The renewed bark after a year and half's growth is one quarter the thickness of that on an untouched tree nine years old. The analysis compared with the latter I will quote:—

	Untouched tree.	Renewed bark.
Total alkaloids	6·36 per cent.	6·39 per cent.
Quinine	1·36	3·21
Cinchonidine and Cinchonine	5·00	3·18

I have carried the analysis further, but that will be enough for the purpose. The renewed bark can scarcely be removed from the tree. It does not differ essentially from bark which renews without moss. At present I am averse to the process, and do not think it can compare with coppicing. It requires much care, and can only be successfully performed in weather when it is too wet to dry the bark out of doors. The mossed bark sold at a lower price (2s. 3d.) than the unmossed (2s. 10d.) on account of its inferior appearance, but this is not a permanent objection, as it really was slightly better. I have not reported yet on the matter of mossing, but my opinion is adverse to its application to *C. succirubra*."

ECHIUUM VIOLACEUM.—Under this name Mr. Edward Newman, in the *Field*, records the discovery of the Channel Islands plant "in some abundance near the Land's End, by Mr. Ralfs, of Penzance." He adds that "the high reputation of Mr. Ralfs as a botanist precludes the possibility of a mistake in this instance."

GLADIOLUS ILLYRICUS, Koch.—The re-discovery of this plant in the Isle of Wight cannot fail to possess much interest and weight in the question whether or not it is to be considered indigenous there. From Mr. A. G. More's account of the finding of this plant in the island, originally recorded in the *Journal of the Linnean Society*, vol. vi., p. 177, it appears that the only specimen found, which is now in the herbarium of the Isle of Wight Philosophical Society at Ryde, was gathered in America Woods, near Shanklin, in 1855, and since that date the plant has not been observed in the Isle of Wight. A plant was sent to me this summer gathered amongst bracken on Lake Common, near the Sandown waterworks, by a lady who found several specimens growing there, which Dr. Boswell Syme and Mr. A. G. More agree with me is *Gladiolus illyricus*. The habitat agrees well with the opinion expressed by Dr. Trimen and Professor Dyer, in their note on the New Forest plant (*Journ. Bot.*, ii., p. 280), which, according to their observations, "seems to prefer dry, open, unsheltered spots on a sandy soil to sylvan situations, and this agrees with Continental habitats." There is therefore some probability that this plant is really native in the Isle of Wight.—FRED. STRATTON.

"**BOTANY**" (vol. ix., pp. 114, 303).—W. Coles, in his "*Perspicillum Microcosmologicum*" (1656), uses this word in the modern sense. In the address to the reader he says, referring to his "*Art of Simpling, an Introduction to the Knowledge and Gathering of Plants*:" "Having already presented thee with one of the Handmaids of Physick, which is *Botany*, I conceive it not altogether impertinent to propose another, and that is *Anatomy*." This word is used in the same sense in the preface to his "*Art of Simpling*."—W. CARRUTHERS.

LEPIDIUM DRABA, *L.*, IN SOUTH HANTS.—This plant, the introduction of which has been affirmed to be one of the results of the ill-fated Walcheren Expedition (*Journ. Bot.*, iv., 260), appears to have become perfectly established in the neighbourhood of Portsmouth and Southsea. I found it plentifully last summer close to Southsea Castle, also in fields and waste ground at the eastern end of the Common, and extending as far as Eastney Barracks. In a list of Hampshire plants just received from Mr. R. A. Pryor this *Lepidium* is mentioned as having been abundant in the same locality in 1868-9. In Watson's *Compendium of the Cybele Britannica*, p. 481, the note as to this species should be amended by the addition of Province 2.—FRED. I. WARNER.

Extracts and Abstracts.

ENUMERATION OF THE CULTIVATED VARIETIES OF LILIUM THUNBERGIANUM.

BY J. G. BAKER, F.L.S., AND W. T. THISELTON DYER, B.A., B.Sc.,
F.L.S.

THERE are now known in cultivation in the open ground a considerable number of forms of this subspecies of *L. bulbiferum*. They are all in flower the first week in July at the same time as *L. croceum* and *L. davuricum*, and after *L. bulbiferum* proper is past.

In general terms, *L. Thunbergianum* admits of being distinguished from the other three subspecies by—1, its dwarfer habit and fewer broader leaves; 2, the absence of bulbs in the leaf axils; 3, the absence of cotton on the pedicels and outside of the flower; 4, the larger, often solitary flowers, which are much less lamellate and papillose.

In the following notes an attempt has been made to settle the nomenclature of the different forms. The descriptions have been principally drawn up from plants grown by Messrs Barr and Sugden at their grounds at Tooting, and we are indebted to the kindness of Mr. Barr for the opportunity of examining them.

1. *Thunbergianum* (proper), *Lindl. Bot. Reg.*, xxv., 1839, t. 38.—The plant figured by Maund, t. 158, and *L. aurantiacum*, *Paxton's Mag.*, vi., p. 127, are similar forms. Mr. Barr's plant differs in its shorter leaves, glabrous stem, less widely expanded flower, with fewer spots and longer filaments.

2. *brevifolium*, Nob.; *Thunbergianum*, Hort. Barr.—Stem under a foot, green throughout. Leaves about 30, lanceolate, bright lustrous green, glabrous; the lower 2—2½ inches long, the upper 1—1½ inch; all ⅜—¾ inch broad. Flower solitary, 3 inches deep, the divisions imbricating, and not so spreading as in typical *Thunbergianum* (*Bot. Reg.*) when fully expanded; inner, 1½ inch, outer 1 inch broad at the

middle, rather pale uniform scarlet; upper three-quarters of each plain and concolorous, lower quarter with a few small black raised papillose spots, very slightly lamellate, and the groove densely hairy. Filaments $2\frac{1}{4}$ inches long; anthers $4\frac{1}{2}$ —5 lines; pollen bright scarlet. Ovary clavate, 1 inch long; style scarlet, 20—21 lines.

3. *bicolor*, Moore, Flor. Mag., t. 104.—Stem under a foot, quite glabrous, purple at the base, green above. Leaves about 40, more crowded and narrower than in 2; lower linear, 3 inches long, $\frac{3}{8}$ — $\frac{1}{2}$ inch broad, with generally three distinct nerves on each side of the midrib, uppermost lanceolate, $\frac{3}{4}$ — $\frac{7}{8}$ inch broad. Flowers 1—2, $3\frac{1}{2}$ inches deep, divisions imbricating when expanded, inner 18—21 lines broad, outer 14—15 lines broad at the middle, crimson or scarlet towards the edge, but with a dash of orange-yellow down the middle; a few faint spots, lamellæ and concolorous papillæ down the lower quarter, groove less than 1 inch long, with hairy raised edges. Filaments $2\frac{1}{2}$ inches long; anthers nearly $\frac{1}{2}$ inch. Ovary $\frac{7}{8}$ —1 inch; style 20—21 lines. To this form is apparently to be referred *L. aurantiacum*, Hort. Krelage, and *L. pictum*, Hort. Siebold.

4. *Wilsoni*, Leichtlin, *pardinum*, Moore, Flor. and Pom. 1868, p. 121, cum tab.—Mr. Moore suspects this to be a hybrid. The general character of the flower approaches *bicolor* in the imbricating divisions with a lighter central dash of colour. It differs, however, from all the other forms in its height, which is about 3 feet, and its flowers in a compound umbel. Something, however, must be allowed for the effect of cultivation.

5. *alutaceum*, Nob.; *Thunbergianum aureum nigro-maculatum*, Fl. d. Serres, t. 1627.—Stem under a foot. Leaves about 30, lower 2— $2\frac{1}{2}$ inches long, $\frac{3}{8}$ — $\frac{1}{2}$ inch broad, upper lanceolate, $1\frac{1}{2}$ —2 inches long, $\frac{1}{2}$ — $\frac{5}{8}$ inch broad. Flower solitary, 3 inches deep, the divisions not imbricating when fully expanded, inner 12—13 lines, outer 9—10 lines broad at the middle, pale apricot colour throughout, with copious small purple black spots in the lower half, nearly obsolete lamellæ and papillæ, edges of the groove less raised than in 2 and 3.

6. *armeniaceum*, Nob.; *venustum*, Hort. Barr.—Stem 1 foot. Leaves 30—40; lower linear, 3 inches long, 4—5 lines broad, uppermost rather shorter and broader. Flowers 1—2, the divisions $2\frac{1}{2}$ inches long, not imbricating when fully expanded, inner 1 inch, outer $\frac{3}{4}$ inch broad at the middle, face quite destitute of spots, lamellæ or papillæ, the groove 8—9 lines long, with hairy edges. Filaments $1\frac{1}{2}$ inch, pale scarlet; anthers $\frac{3}{8}$ inch. Ovary $\frac{5}{8}$ inch; style 13—14 lines.

L. citrinum, Hort. Wilson, appears to be a form nearly related to this. It was shown at Birmingham, but we have not had the opportunity of comparing it side by side with *armeniaceum*. A luxuriant growth is characteristic of Mr. Wilson's treatment of Lilies; the following notes are not, therefore, strictly comparable with those given for the other forms.—Stem $2\frac{1}{2}$ feet, green. Leaves about 30, $3\frac{1}{2}$ —5 inches long, $\frac{1}{2}$ —1 inch wide, 3—5 veined; uppermost rather shorter, $1\frac{1}{4}$ inch wide, about 7-veined. Bracts lanceolate, $1\frac{1}{4}$ inch long. Flowers 3, divisions not overlapping when fully expanded, concolorous, destitute of spots.

7. *sanguineum*, Hort.; *biligulatum*, Hort.; *lateritium*, Bull Cat.—Stem 12—16 inches, purple towards the base. Leaves about 40,

lanceolate, 2—2½ inches long, $\frac{5}{8}$ — $\frac{3}{4}$ inch broad. Flowers 1—2, the divisions 4 inches long, not imbricating when fully expanded, inner 16—18 lines, outer 12—13 lines broad at the middle, deep scarlet, obscurely mottled with reddish-yellow, a few scattered black spots in the lower half above the claw; papillæ and lamellæ nearly obsolete, hairy groove an inch long, the raised edges of the keel visible up to the tip. Filaments nearly 3 inches long, deep crimson in the upper half; anthers under $\frac{1}{2}$ inch. Ovary 13—14 lines; style 2 inches. This does not substantially differ from *L. sanguineum*, Bot. Reg. xxxii., t. 50.

8. *atrosanguineum*, Nob.—Stem 15—18 inches, green throughout. Leaves linear-lanceolate, 2—2½ inches long, $\frac{1}{2}$ — $\frac{3}{4}$ inch broad, uppermost ovate, 1 inch broad. Flower solitary, 3—3½ inches deep, divisions imbricating when fully expanded, inner 18—20 lines, outer 13—14 lines broad at the middle, very dark crimson, rather paler towards the tip, lower half with copious scattered small immersed oblong nearly black spots and numerous, but not conspicuous, papillæ and lamellæ, hairy groove less than 1 inch. Filaments 2¼ inches, deep crimson; anthers $\frac{3}{8}$ inch. Ovary, $\frac{7}{8}$ inch; style under 2 inches, deep crimson. *L. hæmatochroum*, Lem. Ill. Hort., t. 503, appears to be a still darker-flowered state of this.

9. *fulgens*, Hort.—Stem above a foot, purple near the base. Leaves up to 40, linear, 2½—3 inches long, 4—5 lines broad, distinctly 3-nerved. Bracts lanceolate, 1½—2 inches long, $\frac{5}{8}$ — $\frac{3}{4}$ inch broad. Flowers 4—6, the divisions 3 inches deep, not imbricating when fully expanded, inner 12—14 lines, outer 9—10 lines broad at the middle, deep crimson spots, papillæ and lamellæ very nearly obsolete, hairy groove $\frac{3}{4}$ — $\frac{7}{8}$ inch long. Filaments under 2 inches long, deep crimson; anthers 4 lines. Ovary $\frac{3}{4}$ — $\frac{7}{8}$ inch; style crimson, 1½ inch. By its taller stem, linear leaves, and numerous flowers, this recedes markedly from *L. Thunbergianum* in the direction of *L. davuricum*. *L. venustum*, Fl. d. Serres, t. 657, agrees with this in habit, but the flower is orange-scarlet, not so deep in colour. *L. fulgens*, var. *staminosum*, Lem. Ill. Hort., t. 422, is this in a “double form.”

Mr. Bull's recently introduced *marmoratum* and *punctatum* we have not seen. The first is probably a variety of *bicolor*, and the latter possibly of *atrosanguineum*.—[Extracted from *Gardener's Chronicle*, Oct. 12, 1872, p. 1356, with corrections.]

Notices of Books.

Primitiæ Monographiæ Rosarum (Matériaux pour servir à l'histoire des Roses). Par F. Crépin. Deuxième fascicule. Gand. Annoot-Braeckman. 1872. (8vo., pp. 133.)

In this work M. Crépin pursues his careful and elaborate study of the Roses. The greater part of the present brochure is taken up by the investigation of the specimens in the herbarium of Willdenow, which he reviews and pronounces upon one by one. The principal

point elicited of interest to us in Britain, is that he shows clearly, partly by evidence drawn from specimens and partly from published records, that Willdenow in characterising *Rosa mollissima* had no clear idea of the plant to which Fries afterwards applied the name, which does not exist at all in the neighbourhood of Berlin; and that therefore Smith's specific name of *mollis* has priority, and ought to be adopted. In his "considerations on the study of Roses," which follow next, he combats the generally received notion of the excessive polymorphism of the Rose-species. In the views which he expresses upon this matter I am not prepared to coincide, but his note at the end on the solidarity of characters and the existence of parallel variations is so excellent, and shows so well the grasp and judgment that govern his researches, that I must extract it:—

"Already in 1861, in the preface to the first edition of the Manual of the Belgian Flora, I have said a few words on the solidarity of characters. By solidarity of characters I mean the correlation which exists between characters that manifest themselves in different organs of the same plant. I will cite an example to explain more clearly what I mean. Thus in Roses when glands appear we see them manifested on the lower face of the leaves, the stipules and bracts, on the petioles, the pedicels, the receptacle, and the sepals; and if they are more intense they reach the upper surface of the foliar organs. Many writers see in these different seats of glandulosity a series of distinctive characters, whereas there really exists only one. Predominance of glandulosity in Roses is usually linked with double-toothing of the leaves. Villo-sity in the genus offers the same phenomena as glandulosity. On the other hand, a certain amount of hypertrophy or atrophy falling short of monstrosity, elongation, dwarfness, giantism, are in their turn the source of modifications which are spread through the different organs—modifications linked to one another, which some writers look upon as several characters instead of one which disappears from all the organs, when the causes which produce it cease to exist. It is certainly in part from an ignorance of these general facts that we owe the creation of a crowd of the minor species which have only a mere book existence."—(p. 112.)

The remainder of the brochure is taken up by a detailed review of three recent publications on the genus—Godet's account of the Jurassic Roses in his supplement of 1869 to his "Flore du Jura Suisse et Français"; Scheutz's Studies of the Scandinavian Roses, Wexio, 1872, a valuable monograph, but unfortunately in Swedish; of the diagnoses of the new forms described in which M. Crépin here gives translations into Latin; and my own monograph of the British species published in 1870, in the eleventh volume of the Journal of the Linnean Society. Of my general plan of species-limitation he expresses full approval. Most of his criticisms on points of detail are certainly well founded. He proposes to alter two of my names for primary species—*mollis*, Smith, instead of *mollissima*, Willd., for reasons already cited; and *inodora*, Fries, instead of *pulverulenta*, M.B., on the ground that my plant, which is certainly the *pulverulenta* of Lindley's monograph, is not identical with that described by Bieberstein, from the Caucasus. M. Boissier told me the same thing immediately he saw my paper, and M. Crépin now

confirms this, and further adds that Lindley after the publication of his monograph admitted that such was the case, and that he gave our plant (in specimens sent to Martius) the manuscript name of *R. pruinosa*. *R. hibernica* M. Crépin is disposed to regard as a hybrid between *spinosissima* and *canina*. Here I do not think he is correct, as it is well-marked in habit, and does not show any tendency to shade off by degrees into either of its suggested parents; but it is curious that it should be so widely spread in Britain, and yet be entirely unknown on the Continent.

J. G. BAKER.

Supplement to the Compendium of Cybele Britannica; showing the distribution of British Plants through the thirty-eight Sub-provinces. Being also a second supplement to Cybele Britannica (the original work in four volumes). By HEWETT COTTRELL WATSON, Thames Ditton. Printed for private distribution only. 1872. (pp. 213.)

THE title of Mr. Watson's latest contribution to the Botanical Geography of Britain is sufficiently exact to prevent any misunderstanding as to its scope and the position it bears to his other works. Two years have elapsed since the completion of the valuable "Compendium," published in three "Parts," in the years 1868, 1869, 1870, each of which was duly noticed in these pages. In that work the species of British plants were traced simply through the eighteen primary "provinces" into which the author divides Great Britain. It was in fact a condensed and amended edition of the original *Cybele*. In the "Supplement," which appeared in 1860, the distribution was exhibited through the thirty-eight "sub-provinces," and in the work before us this is again done in greater detail and brought up to the end of the year 1870. This has been fixed on by the author as "a definite date up to which he may deem his works brought in a general view," and beyond which "neither in this second supplement nor in any possible subsequent work of kindred character" will he attempt to advance; except that any special discoveries brought under his notice by botanical correspondents will be taken into account. This probably means that all matter bearing on British topographical botany published during the past two years—which as the pages of this Journal show have been very prolific both of new species and localities—will be left unnoticed unless the facts may have also been brought to Mr. Watson's knowledge by verbal or written communications from other botanists. It seems important to remember this in using the volume.

The author's remarkable powers of judicious concentration of his matter are very conspicuous in his treatment of the immense number of facts marshalled in these pages. In the first part of the book, to p. 111 (the second portion will be presently alluded to), the whole space allotted to each species is but two lines, so that seventeen are included in each page. The first line consists of the name of the species, and the second gives the numbers representing the sub-provinces in which it has been ascertained to grow. When these do not occupy the whole line, the space left is often filled by necessarily brief notes or

references, which occasionally overflow into the line above, occupied only by the name. When there is suspicion of the species having been introduced into any sub-province by human agency, the number is enclosed in round brackets, whilst alleged occurrences for which there is ground of distrust, or pretty certain errors, are distinguished by being placed between square brackets. The distribution of a number of segregates is given on a quite similar formula, two or more segregates being occasionally treated in connection. A few well-established aliens are also included.

It appears to have been originally intended by the author that the work should have consisted of no more than the list above described, and that it should have been immediately followed by a larger work tracing each species through the 112 "counties," with a citation of authorities for the facts given. As this would have been a boon to all English botanists, and indeed seems wanting to complete the scheme of the connected works, it is a matter for great regret that the intention has had to be given up, especially when the cause of its abandonment is, as is pretty easily to be seen, the failing health of its author. Apparently to some extent in the stead of this, a Second Part (pp. 112—177) has been added to the present book, consisting of "a summary of the writer's own personal experiences bearing on the details of provincial distribution," chiefly consisting of records of "sub-provincial habitats which have come under the writer's own individual observation; but frequently . . . citing the names of botanists who have sent specimens" to the author.

In this list a single line only is allotted to each species, and the whole information given by it is expressed above. It consists of the records of the actual experiences of a single botanist conspicuous for his careful accuracy in matters relating to plant distribution, though in one case (*Wolffia arrhiza*, p. 166) a mere suggestion, unsupported by any fact, and to which the person named can give a distinct negative, is admitted. The value and utility of this catalogue will perhaps be more fully seen hereafter than can be the case at present, if we are to believe that its author will carry out the intention expressed in a "Postscript" (p. 179, 180) to the volume. This, which is probably unexampled in the history of Botany, is to the effect that certain considerations suggest to the author "that it will be prudent to destroy his extensive British herbarium"! The reasons given for this frightful resolution, which it may be hoped something will prevent ever being carried out, are that the chief object in collecting it has been accomplished, and that a mischievous use might be made of it after his decease. Really, since he gives us to understand that his own work is over, one would scarcely feel surprised at Mr. Watson announcing his intention of mounting the funeral pyre and immolating himself along with his herbarium.

There is nothing more of general interest in the volume, but an appendix is added of some thirty pages, headed "controversial." With reference to this the reviewer feels it necessary to say a few words in his own name, which occurs so frequently in it.

As this may very possibly be the last book of Mr. Watson's I shall be called upon to notice, I am anxious to take the opportunity of publicly denying in the most emphatic manner that I have ever been actuated

towards the author of the "Cybele" by other feelings than those of friendship and regard. Whatever anger or bitterness there may be, it is wholly on his side, as is clearly seen by the letters which he has thought it fit to reprint in the appendix above mentioned, and one of which he has rewritten and intensified. That this animosity was conceived towards me *personally*, and antedated my "acknowledging myself the anonymous reviewer," and indeed that any such acknowledgment on my part was unnecessary, is evident from this fact, which—to complete the history here given by Mr. Watson—may as well be placed on record. Immediately on the receipt of his printed letter (January 12, 1871), though greatly pained by its tone, I wrote a short and friendly note, offering to give it the same circulation, by printing it in this Journal, that the review to which it objected had had. To this note I received a reply so studiously uncivil as to prevent any further intimacy between us.

In the notices of Mr. Watson's works which I have written in these pages, I have always treated them as the productions of a botanist of acknowledged standing in his special department, and have never written a word intended to wound the pride or hurt the sensibilities of their author. That he should have felt aggrieved at the slight criticisms I have on one or two occasions felt it necessary to make, has caused me regret, and I protest against the imputation to me, by an angry author, of unworthy motives which I never felt.

I have no desire to go into the "tedious explanations" which Mr. Watson has made about a matter which, so far as I am concerned, shall not again be publicly alluded to. I have nothing to alter and no word to retract in the letter which occupies pp. 196—198 of the above-mentioned appendix. My review, from which Mr. Watson has taken the passages—carefully isolated from their context—to which he objects, will be found in vol. viii. (1870), pp. 394—397, and ought to have been printed entire in Mr. Watson's appendix.

HENRY TRIMEN.

Proceedings of Societies.

LINNEAN SOCIETY. Nov. 7th, 1872.—G. Bentham, Esq., F.R.S., President, in the chair. The Rev. C. W. Penny was elected a Fellow. Two letters from Lady Smith (widow of Sir J. E. Smith, now in her 100th year) were read offering to the Society seventy-four letters addressed to her husband by A. McLeay, between 1788 and 1825. The president exhibited for Mr. M. Alford a "Hen and Chicken" Daisy found apparently wild near Bridgewater. The following papers were read: "Note on the Buds developed on the leaves of *Malaxis*," by G. Dickie, M.D. These are often described as forming a fringe to the leaves, but the specimens examined had only a few on the margin near the tips, though they were rather numerous and crowded

on the upper surface, in some cases two being coherent. They consisted of a flask-like cellular green sac, with a narrow opening at the apex, and having within it at its base a yellowish-green nucleus-like body. A close resemblance was to be traced between these buds and the ovules of some of our native orchids—*e.g.* *Habenaria viridis*. In Irmisch's "Beitrage zur Biologie and Morphologie der Orchideen," young axillary buds of *Microstyles monophylla* are figured, which somewhat resemble those of *Malaxis*, as there is a central nucleus and a rudimentary sheathing leaf looking like an ovular coat. The case of *Malaxis* indicates the ovule to be homologous with the bud, the nucleus-like body corresponding with the axis and the cellular open-mouthed sac to an embracing leaf. "On a Menispermaceous Plant called by Vellozo *Cissampelos Vitis*, and figured in his *Flora Fluminensis*, vol. x.," by J. C. de Mello, translated by John Miers, Esq.; considered to belong to the tribe *Tinosporeæ*, and placed in the genus *Burassaia*.

November 21st.—G. Bentham, Esq., F.R.S., President, in the chair. C. C. Grundy, Esq., and E. Harris, Esq., were elected Fellows. The following papers were read:—"Catalogue of the Compositæ of Bengal," by C. B. Clarke. "On *Hydrotrophus*, a new genus of Hydrocharideæ," by the same. A stemless annual found growing in still water in Eastern Bengal; it has narrow linear leaves 2—4 feet long and small solitary white flowers extruded from the spathe during expansion. *H. echinosperma* is the only known species. "On diversity of Evolution under one set of external conditions," by the Rev. J. T. Gullick.

EASTBOURNE NATURAL HISTORY SOCIETY. October 18th, 1872. "Notes on the Genus *Lemna*," by F. C. S. Roper, F.L.S.—Anatomical and Physiological remarks were made on all the British species. *Lemna gibba* had been specially studied. The author said:—"From the observations I have made on this species, I believe that it is only during its fully mature state, and when about to produce blossom, that it assumes the characteristic gibbous form, and that on the approach of winter the cell contents contract considerably, so as to make it assume the form of *L. minor*. But the structure of the carpel is sufficient to show that the species are distinct. Mr. Syme, in the new edition of English Botany, states that he has never seen the flower. Mr. Borrer is reported to have been the first who discovered the fructification in England, his specimens being obtained in June, 1804, from the neighbourhood of Lewes. I had in vain looked for the inflorescence in this tribe of plants for many years, and only observed it for the first time in this species, in a gathering made in July last; when I met with it abundantly, in blossom, in the ditch running by the side of the Pevensey road, not far beyond Christ Church. Having kept the plants to the present time, I have had a good opportunity of observing both the structure of the flowers and pollen, as also the germination of the seeds, and I propose, therefore, to describe it rather more in detail. The inflorescence—flower it can hardly be called—having neither calyx nor corolla, springs from the under side of the frond, at the notch where the new frond is given off; it is said by previous writers, and copied in most botanical works, to be enclosed

in a membranous case or spathe, but though occasionally I found small pieces of the cellular tissue partly surrounding the stamens and pistil, I failed in any case to find them attached to it, as the spathe is in the Arum tribe; and I believe that the inflorescence simply springs from a narrow opening in the cuticle of the frond, and that the portion raised by the protrusion of the flower has been mistaken for the spathe; at all events, I invariably found that the pistil and stamens came off by the slightest touch of a needle, perfectly free. The inflorescence is quite unique in its structure, and consists solely of two stamens and a pistil, the extreme breadth of the whole when in bloom being about one-thirtieth of an inch. The filaments of the stamens, of which there are two, are formed of cellular tissue and remarkably thick in comparison with the size of the flower, being about one-seventieth of an inch in diameter, or nearly one-third of the breadth of the flower; they have also this peculiarity, that when the first is fully grown and the anthers are discharging pollen, the second is immature, and does not come to perfection until the first is decaying. This has given rise to the idea entertained by some botanists, that they should be considered as separate flowers: in fact that the plant is monœcious, each stamen being a flower, and the pistil another. The true interpretation being, as far as my observation goes, that this peculiarity is provided simply for the preservation of the species, the plant floating on the surface of the water and being thus exposed to every vicissitude of weather, it is so planned that should wind or rain disperse the pollen from one stamen, the ovule may be fertilised by the other when it becomes mature. The anthers, of which there are two to each stamen, are slightly oval or pyriform, and about one-hundredth of an inch in diameter, and open by a transverse slit to discharge the pollen, which is muricate or slightly spinous and about one-thousandth of an inch in diameter. A remarkable fact in so minute a flower is, that the pollen tubes are plainly visible and are so well developed that I have observed them continue intact on breaking the pistil, uniting the two parts by minute threads. The pistil, or what might perhaps be more properly termed the carpel, rises between the two stamens; and is formed of loose cellular tissue, cylindrical or slightly urnshaped, rather shorter than the stamens when fully grown, and contains generally two ovaries at the base, with a thickened style, of about the same diameter as the filaments of the stamens, but without any apparent stigma; the surface of the cylindrical style ending abruptly and enclosing a depressed cavity, like a small cup, into which the pollen tubes can plainly be seen to enter. The capsule, when ripe, contains four seeds, which form segments of a sphere, or resemble a quarter of an orange: when ripe and dry they are of a brownish grey colour, strongly marked with about three prominent rounded ribs on each side, and fixed by one extremity to the base of the capsule, the seed itself being enclosed in a brown case or testa, and surrounded by a thin semi-transparent cellular covering, which can be separated from the true seed, and may be designed simply to afford means of its more readily floating on the surface of the water. At the upper end of the seed is a small circular cap, which is raised by the swelling cellular tissue as the seed germinates, and in all the cases I have examined remains attached to the young fronds, even

when the rootlets are far advanced. In a paper by L. C. Richard, in the Archives de Botanique, vol. i., t. 6, fig. OE., a very good representation is given of the young frond, showing the seed vessel, the frond, the sprouting radical, and the lid of the seed attached, as in the drawing I have made from an actual specimen. The blunt end of the radical is here well shown. The seeds appear to germinate equally well on the surface of the water, or on the damp sides of the vessel in which the specimens were contained, and probably the species are preserved more frequently by these germinating seeds than by buds, as stated in most botanical works, the fact being that the seeds have not been noticed. I have brought the description of this plant so fully before the Society, because as far as I am aware, no details of its anatomy can be found in any English botanical work, and I wish to place on record the facts here stated."

Botanical News.

ARTICLES IN JOURNALS.

Annales des Sciences Naturelles (ser. 5., tom. xv., nos. 1—4, August, 1872.)—M. Cornu, "Monograph of Saprolegniæ, part 1, Sexual Reproduction" (Pl. 1—7).—E. de Glinka Janczenski, "Morphological Researches on *Ascobolus furfuraceus*, Pers" (Pl. 8).—MM. Tulasne, "New Observations on the *Tremellini* and their Allies" (Pl. 9—12). *—Ph. van Tieghem, "Anatomical Observations on the Cotyledon of Grasses" (Pl. 13, 14)

(Nos. 5 and 6—September, 1872.)—G. de Saporta, "Researches in the Vegetation of the South-east of France in the Tertiary Epoch" (Pl. 15, 16).—Triana and J. E. Planon, "Prodromus Floræ Novogranatensis." (*Simarubeæ*, *Zygophylleæ*, *Meliaceæ*, *Chailletiaceæ*, *Olacineæ*.)

NOVEMBER, 1872.

Grevillea.—M. J. Berkeley, "Notices of N. American Fungi" (continued).—M. C. Cooke, "British Fungi" (continued).—English Translation of Grunow's 'Novara' Diatoms (continued).

Science Gossip.—R. Garner, "A Curious British Plant" (figs. 174, 175). A supposed hybrid between *Vaccinium Myrtillus* (time of flowering, flower, fruit) and *V. Vitis Idæa* (stem and leaves); pollen shrunken, few perfect seeds.†

American Naturalist.—J. Orton, "Plants of the Valley of Quito."—R. Ridgway, "Notes on the Vegetation of the Lower Wabash Valley."—E. D. Cope, "The Geological Age of the Coal of Wyoming."—N. S. Shaler, "Effect of Extraordinary Seasons in the Distribution of Animals and Plants."

* This memoir was published in English, without the figures, in Journ. Linn. Soc. xiii., 31–42.

† See also Journ. Bot. ix., p. 122.

Botaniska Notiser.—V. F. Brotherus, "Extracts from Letter to J. E. Zetterstedt" (On the Botany of the North of Russia).—S. O. Lindberg, "Various Notes on Scandinavian Mosses" (*Leskea*? *papillosa*, n.sp.)

Hedwigia.—Venturi, "On *Orthotrichum*."—A. Geheeb, "Bryological notes."—R. Ruthe, "A New Species of *Fontinalis*" (*F. androgyna*).

Botanische Zeitung.—F. Hegelmaier, "On the Morphology of the genus *Lycopodium*" (tabs. x.—xii.)—G. Winter, "Some Remarks on Niessl's Contributions to the Knowledge of Fungi."

Flora.—J. Müller, "Lichenum species et varietates novæ" (continued).—A. Geheeb, "Bryological remarks."—G. Winter, "Diagnoses and Notes on Rehm's Ascomycetes."—H. Wawra, "Remarks on the Flora of the Hawaii Islands."

Bull. de la Soc. Roy. de Bot. de Belgique. (tom. xi., no. 1, 7th Nov.)—E. Marchal, "Reliquiæ Libertianæ."—F. Crépin, "Primitiæ Monographiæ Rosarum. Fasc. ii. Revision of the Roses in the Herbarium of Willdenow" (see p. 23).

(No. 2., 21st Nov.)—J. Chalon, "Notes of a Tourist."—A. De Vos, "On the Naturalization of some Exotics at the Montagne St. Pierre lez Maastricht."

New Books.—E. Strasburger, "Die Coniferen und die Gnetaceen, eine Morphologische Studie." (H. Davis, Jena. 8vo., with a 4to. atlas of 26 plates, 14 thaler 20 sgrs.=£2 4s. 0d.)—E. Meyer, "Excursions—flora des Grossherzogthums Oldenburg."—F. Crépin and others, "Catalogue de la flore de Belgique."—J. Grönland, M. Cornu, and G. Rivet, "Des préparations microscopiques tirées du Règne Végétal, &c."—"Catalogue of Scientific Papers" (Royal Society), vol. vi., completing the alphabetical list of authors.

Dr. A. Braun has given in the Monatsbericht of the Royal Berlin Academy of Sciences for August, 1872, a synoptical revision of the genera *Marsilea* and *Pilularia*, 51 species of the former and 5 of the latter being enumerated.

In the "Verhandlungen" for 1872 of the Zoologico-Botanical Society of Vienna, is a list of all the Phanerogamic plants hitherto found in the kingdom of Poland, under the title of *Floræ Polonicæ Prodrömus*, by J. Rostafinski. The catalogue, to which is prefixed a short historical account of previous publications, contains 1325 species.

Dr. O. Nordstedt describes in the 6th part of the "Ofversigt" of the Stockholm Academy of Sciences for 1872 the *Desmidiaceæ* collected by the Swedish Expeditions in 1868 and 1870 to Spitsbergen and Bear Island. Fifty species are enumerated, nine being described as new, and carefully figured.

The "Verhandlungen des Bot. Verein für die Provinz Brandenburg" for 1871, just published, contains numerous communications on the local Botany of Germany, a paper by Sadebeck on *Asplenium adulterinum*, Milde, a memoir of the late August Neilreich, and other papers.

A sixth century of M. C. Cooke's "*Fungi Britannici Exsiccati*" has appeared. Several new species are included, *Uromyces Salicorniæ*, *Adocephalum roseum*, *Peziza Typhæ*, and *Venturia atramentaria*. *Helotium puberulum*, Fckl., and *Capnodium salicinum*, P., two species not previously found in Britain, are also included.

A "Flora of the Isle of Man" is announced to be in preparation, by Mr. J. F. Robinson, of Frodsham, Cheshire. The price of the volume to subscribers is not expected to exceed 2s. 6d. Considering the very varied contents promised in the prospectus, including "beautiful engravings of the principal Island scenery (waterfalls, &c.), an actual specimen of the Manx Fern (*Adiantum Capillus-veneris*) mounted as a vignette," a detailed description of all the indigenous ferns and trees, an introduction of botanical rambles, the folk-lore of wild-flowers, a life of Professor E. Forbes, F.R.S., and an appendix "especially adapted for ladies," describing a new method of nature printing, making skeleton leaves, &c., with "a very interesting coloured botanico-geological map of the island, drawn and coloured by Professor Forbes when quite a youth," thrown in, the price cannot be considered excessive.

A second volume of Boissier's "*Flora Orientalis*" is announced as nearly ready for publication.

The stock of impressions first printed of Hooker and Baker's *Synopsis Filicum* is exhausted, and it is intended to issue shortly a revised edition. As the only way of avoiding a heavy pecuniary loss on a work of this description was either to print off a large impression or to stereotype the letterpress, and the latter alternative was followed, the amount of alteration in the original text will be limited by this circumstance, and the additional material which has been obtained during the last half-decade will be mainly given in an appendix. There are nearly twenty new species in *Cyathea* alone, and as many *Alsophilas*. The additions of the last five years will probably mount up to somewhere between one and two hundred genuine species.

At a meeting of the Norfolk and Norwich Naturalists' Society on October 29th, an important list of West Norfolk Fungi was read, contributed by Mr. C. B. Plowright, of the Lynn Hospital. He had collected and identified no less a number than 600 species of Fungi within a radius of fifteen miles round Lynn.

The remodelled University of Rome has secured, as Professor of Botany, De Notaris, of Geneva.

Mr. E. W. Holmes, author of a Catalogue of the Cryptogamia of Devon and Cornwall, has been appointed Curator of the Pharmaceutical Society's Museum.

A Botanical Society has been formed at Luxembourg, of which Mr. Krombach is secretary, and has enrolled a good number of members. It is intended to form a herbarium of the plants of the Grand-Duchy, and MM. Fischer and Kolz are compiling a catalogue of the flora.

The herbarium of Prof. Hoppe has been acquired by the Gymnasium of Salzburg.

Prof. Fee, of Nancy (late of Strasbourg), has presented his herbarium to the Museum of Rio Janeiro.

The herbarium of Prof. Meisner, of Bâle, has been purchased for Columbia College, New York.

Original Articles.

JUNCUS PYGMÆUS, *Rich.*, AS A BRITISH PLANT.

BY HENRY TRIMEN, M.B., F.L.S.

(TAB. 128.)

I HAVE great satisfaction in being able to fulfil my promise of giving a description of one of the most interesting additions to our flora in recent years. The discovery of this pretty little Rush by Mr. W. H. Beeby was recorded in this Journal (vol. x. (1872), p. 337), where I also briefly indicated the grounds upon which I considered it to be *Juncus pygmæus*; the necessarily more minute examination since made, whilst it has left no doubt as to the correct name of the plant, has also fully confirmed the opinion of continental authors, who consider it quite distinct from the allied species.

J. PYGMÆUS, Richard.—Annual, cæspitose, 1 to 2 ins. high. *Root* fibrous; *stems* slender, erect, smooth, terete, with a single leaf or leafless, simple or with a single branch; radical *leaves* rather rigid, linear, sheathing at the base, channelled, with faint distant articulations, acute; stem-leaf single, with an auricled sheath; *flowers* nearly sessile, with a membranous ovate bract at the base of each, 1 to 4 (usually 3) in small clusters, often with a leaf at the base which scarcely exceeds them, at the extremities of the stems and branches; *perianth-leaves* rather less than $\frac{1}{4}$ inch long, equal, linear-lanceolate, the three outer very slightly broader almost completely covering the three inner, thin, papery, the marginal portion transparent, 3-nerved, the central nerve slightly stronger, gradually and equally attenuated to the (non-cuspidate) apex; *stamens* 6 (or by abortion 4 or 5) or 3, attached to the base of the perianth-leaves and about $\frac{1}{3}$ or $\frac{2}{3}$ their length, anther not half as long as the filament; *ovary* tapering, longer than the stamens; *capsule* $\frac{3}{5}$ (or a little more) the length of the perianth-leaves and concealed by them, subtrigonous, acute, oblong-lanceolate in outline, pale brown, valves linear; *seeds* numerous, fusiform pear-shaped, with strongly marked longitudinal ribs, dark orange-brown. The plant is tinged with a rather bright pink.

The above description is made from a very few Cornish specimens; a larger series from that county might show the plant to vary in certain particulars in the same way as continental examples. These are sometimes 5 inches high, with longer leaves and more distinct articulations, and the stems with two, three, or even more branches; the fascicles, too, often contain as many as 9 or 10 flowers, which are sometimes shortly stalked. In the essential characters of the flower, however, there is complete agreement between English and foreign specimens. Grenier and Godron, and other authors state that the stamens are always 3, and this character has been considered one of very great importance in distinguishing the species; but I find, in French and Portuguese examples, the number of stamens to vary from

3 to 6, just as in the plants from Cornwall. This variability in number of stamens occurs also in other species, *e.g.*, *J. supinus*. Far more constant characters are, however, presented by the perianth, the capsule, and the seeds, by any of which the plant is readily recognised. The only two British Rushes with which confusion is possible are *J. capitatus* and the fasciculate variety of *J. bufonius*, which has received the name of *J. insulanus* from Roemer and Schultes, and *J. fasciculatus* from Bertoloni. From the former, *J. capitatus*, it differs by its much longer flowers, its equal perianth-leaves which are not aristate and recurved at the tips, and the oblong acute capsule; whilst it is distinguished from all states of the variable *J. insulanus* by its much smaller capsule, which is even when quite ripe very nearly or entirely hidden by the perianth, and by its ribbed seeds. These, as shown by Buchenau in his useful paper (Journ. Bot. vi., p. 142), give often excellent characters in this genus; in *J. insulanus* they are orange-coloured, barrel-shaped, and very minutely reticulate, instead of being pear-shaped, strongly costate, and brown as in *J. pygmæus*. But even in the absence of fruit and seed there is no difficulty in recognising the two species, *J. pygmæus* and *J. bufonius* (in all its forms) by the perianth-leaves alone, which in the latter are always more or less (often exceedingly) unequal, and are provided with a single broad strong green midrib produced at the apex into a stout apiculus; whilst *J. pygmæus*, as above described, has delicate papery equal segments with three slender veins; moreover the segments of *J. bufonius* are spreading and widely separated at the points, whilst those of *J. pygmæus* are parallel and approximated or connivent at their ends even in ripe fruit.

In every edition of Professor Babington's Manual this species has been entered between brackets, with the remark that it "will perhaps be found in sandy places near the sea"; after nearly thirty years this expectation has been fulfilled. The Cornwall locality is "in a damp hollow on the downs near Kynance Cove not more than 12 or 15 feet square," where the plants were growing pretty thickly. It was not noticed elsewhere, but no doubt grows in similar places near. It should be looked for early in the year; Mr. Beeby's specimens were collected in June, and are in fruit.

J. pygmæus has an extensive range in Europe, including the Mediterranean region at intervals from Greece to Spain, and the whole western coast; extending also in a north-east direction as far as Holstein and (formerly) the south of Sweden. Damp sandy ground is the usual habitat, and nearly all the localities are within the influence of the sea, though there are localities in France at some distance from the coast. The following list of countries gives a good idea of its distribution:—*Greece*, Nyman; *I. of Milo*, Kunth; *Sicily*, Todaro!, Huet de Pavillon!; *Istria*, Tommasini; *Italy*, Pisa, Van Heurck!; *Elba*, Caruel; *Corsica*, Soleirol!; *Portugal*, Welwitsch! (see. vol. x., p. 135); *Spain*, Lunge, Graells!; *France*, Toulon, Muller!, Lyons, Billot!, Montbrison, Schultz!, Paris, Stephan! (especially frequent in the west, but not yet noticed in the Channel Islands); *Belgium*, near Antwerp, Crépin; *Holland*, Nyman; *N. Friesland Is.*, Buchenau (see vol. vi., p. 149); *Holstein*, Reichenbach!; *Sweden*, formerly found in Scania (see Fries' Novitiæ, p. 92).

The synonymy of the species is as follows:—

Juncus pygmæus, Rich. in Thuill. Fl. Par., ed. ii., p. 178 (1799).

J. nanus, Dubois, Orleans, p. 290 (1803).

J. hybridus, Brot. Fl. Lusit. i., p. 413, pro maxima parte (1804); non auct. plur.

J. triandrus, Reichenb. Ic. Fl. Germ. ix., p. 17; non Gouan.*

J. bupleuroides, Pourr. Herb., fide Lange.

J. fasciculatus, Huet de Pav. in sched. Fl. Sic.; non Schousb.

J. bicephalus, Bertol., fide Caruel; non Viv.?

The *Juncus mutabilis* of La Marek's Dict. Encycl. iii., p. 270, probably includes this species as well as forms of *J. bufonius*. The capsule is described as a little longer than the perianth, which will not do for our plant, and prevents one accepting the name, though older by ten years (1789) than Thuillier's. *J. Sorrentinii* of Parlatore (Fl. Ital. ii., p. 356) from Corsica and Sicily ought also probably to be added to the synonyms, but I have not seen specimens. *J. bicephalus* of Viviani (Fl. Cors. diagn., p. 5) is said to be different, but must from the description be closely allied.

Figures will be found in Flora Danica xi., t. 1871, and Reichenbach, l.c. ix., t. 391, f. 864; but neither are satisfactory in details.

Specimens have been published in Billot's Exsiccata, n. 674; Schultz Herb. norm., n. 734, 1152; Fries Herb. norm., f. 11, n. 69; Van Heurck Exs., n. 341; Reichenb. Fl. Germ., n. 1127; Todaro, n. 457; and other collections.

DESCRIPTION OF TAB. 128.—Fig. 1, *Juncus pygmæus*, Rich., from specimens collected in Cornwall, June, 1872, by W. H. Beeby. 2, A flower with three; and 3, one with six stamens, with the perianth-leaves spread open, $\times 4$. 4, Flower when fruit is ripe. 5, Outer, and 6, inner perianth-leaf, all $\times 7$. 7, Capsule $\times 8$. 8, Seeds $\times 40$.

ON ROSA APENNINA, Woods.

BY J. G. BAKER, F.L.S.

IN his "Tourist's Flora," at page 123, Woods characterises in two lines and a half a new rose of the *Rubiginosæ* group, from the Apennines, which he names *Rosa apennina*. The plant was described so briefly that no one has been able to identify it, and I was asked some time ago by M. Crépin to examine specimens and report upon them. This, through the kindness of Mr. Townsend, who has been so good as to send me the type specimens of Woods for leisurely examination and comparison at home, I have now done, so as to be able to draw up a detailed description.

R. APENNINA, Woods, *Tourist's Flora*, page 123.—Bush small, compact, with the habit of *spinosissima*. Prickles numerous, rather unequal, but not dwindling down into aciculi as in the *spinosissima* group; the largest decidedly falcate, a quarter of an inch long, with a hook deflexed beyond opposite where the dilated base reaches, the weaker

* Gouan's plant (Herb. Montp. p. 25, 1796) is *J. capitatus*, Weig.

ones nearly straight. Branches quite glandless, like the petioles and stipules suffused with vinous red. Stipules under a line broad, with deltoid free tips, naked or the faces densely gland-ciliated. Leaves not more than half an inch long; petioles densely glandular, not at all hairy, either with or without 1—2 minute prickles; leaflets not more than five, the end one oblong, quarter of an inch long at the uttermost, rounded at both ends; toothing moderately open and deep, moderately compound; upper face quite naked, or with a few very obscure scattered glands; lower face covered with copious large conspicuous glands, not at all hairy unless very minutely on the midrib. Flowers always solitary. Peduncle very short and naked. Bracts lanceolate, naked on the faces, densely glandular on the edges. Calyx-tube ovoid or globose-urceolate, not more than an eighth of an inch long, at the flowering stage quite naked. Sepals $\frac{1}{4}$ — $\frac{3}{8}$ of an inch long, naked on the back; the minor ones simple, the major ones cuspidate, not dilated at the tip, furnished with 1—2 minute linear gland-ciliated pinnæ; the blade itself not gland-ciliated. Expanded flower three-quarters of an inch across. Disk broad. Styles free, protruded, glabrous. Fruit ellipsoid-urceolate.

Birigazza, Apennines, July, 1826.—*J. Woods.*

I do not remember to have seen any named rose among continental specimens that matches it exactly. In a broad sense it is one of the innumerable varieties of *R. sepium*, the common briar of exposed places throughout the Mediterranean region, next to which Woods places it. Of named forms with which I am acquainted, it comes nearest to *R. agrestis*, Savi (Déséglise Essai, p. 104), of which specimens will be found in Billot, Exsicc. 2263, and Déséglise, Exsicc. 33, differing by its compact habit of growth carried out into each detail, as for instance, the extremely short peduncles and leaflets rounded instead of gradually narrowed at each end.

CONTRIBUTIONS TO THE FLORA OF NORTH CORNWALL.

BY THE REV. W. M. HIND, LL.D.

THE following list of plants, observed during the past summer in North Cornwall, is submitted for the information of the readers of the Journal of Botany. The district examined is that portion of the county which lies north of a line drawn from the Tamar at Bridge-rule to Tintagel Head on the coast. When no locality is given, the plant is frequent or common.

Clematis Vitalba, L.	Poughill.	Papaver somniferum, L.
Ranunculus hederaceus, L.		Corydalis lutea, DC.
„ Flammula, L.		Fumaria capreolata, L. Bude.
„ acris, L.		„ officinalis, L. Bude.
„ repens, L.		Cheiranthus Cheiri, L.
Caltha palustris, L.		Nasturtium officinale, R. Br.
Delphinium Consolida, L.		Barbarea vulgaris, R. Br.
Papaver Rhæas, L.		Cardamine sylvatica, Link.

- Cardamine pratensis*, L. Bude.
Sisymbrium officinale, Scop.
Alliaria officinalis, Andr.
Brassica campestris, L. Bude.
 „ *Napus*, L. Norcot Mouth.
Sinapis nigra, L.
 „ *arvensis*, L.
Diplotaxis muralis, DC. Bude.
Cochlearia officinalis, L.
 „ *danica*, L.
Armoracia rusticana, Rupp.
Lepidium campestre, R. Br. Poughill.
Lepidium sativum, L.
Capsella Bursa-pastoris, DC.
Senebiera Coronopus, Poiret.
 „ *didyma*, Pers. Stratton.
Cakile maritima, Scop. Bude.
Reseda Luteola, L. Marham-Church.
Viola odorata, L. Poughill.
 „ *sylvatica*, Fries.
 „ *canina*, L. Sandhills, Bude.
 „ *tricolor*, β . *arvensis*, Murr.
Polygala vulgaris, L. Bude, &c.
Saponaria officinalis, L. Introduced, Bude.
Silene inflata, Sm.
 „ *maritima*, With.
Lychnis Flos-cuculi, L.
 „ *diurna*, Sibth.
Sagina procumbens, L.
 „ *apetala*, L. Stratton.
 „ *nodosa*, E. Meyer. Bude.
Mœhringia trinervis, Clairv.
Arenaria serpyllifolia, L.
Stellaria media, With.
 „ *Holostea*, L.
 „ *graminea*, L.
Cerastium glomeratum, Thuill. Ashton.
 „ *triviale*, Link.
 „ *semidecandrum*, L. Poughill.
 „ *tetrandrum*, Curt. Coast—Bude.
Malva moschata, L.
 „ *sylvestris*, L.
Lavatera arborea, L. Tintagel.
Tilia grandiflora, Ehrh. Planted.
Hypericum Androsæmum, L.
- Hypericum quadrangulum*, L.
 „ *perforatum*, L.
 „ *dubium*, Leers. Kilkhampton.
Hypericum pulchrum, L. Ashton, &c.
Hypericum Elodes, L. Week St. Mary.
Acer campestre, L. Marham-Church.
 „ *Pseudo-platanus*, L. Stratton, &c.
Geranium dissectum, L.
 „ *molle*, L.
 „ *Robertianum*, L.
Erodium cicutarium, Sm. Bude.
 „ *maritimum*, Sm. Boscastle.
Linum angustifolium, Huds.
 „ *catharticum*, L.
Oxalis Acetosella, L. Lansells.
Euonymus europæus, L. Marham-Church.
Rhamnus catharticus, L. Lansells.
Ulex europæus, L.
 „ *nanus*, Forst
Genista anglica, L. Week St. Mary.
Ononis arvensis, L.
Medicago lupulina, L.
 „ *sativa*, L. Poughill and Bude.
Melilotus officinalis, Willd. Stratton.
 „ *arvensis*, Willd. Kilkhampton.
Trifolium pratense, L.
 „ *medium*, L.
 „ *arvense*, L. Tintagel Head.
 „ *scabrum*, L. Bude.
 „ *repens*, L.
 „ *fragiferum*, L. Bude.
 „ *procumbens*, L.
 „ *minus*, Sm.
Lotus corniculatus, L.
 „ *major*, Scop.
Anthyllis Vulneraria, L.
 „ *var. Dillenii*. Downs, Bude.
Vicia hirsuta, Koch.

- Vicia tetrasperma*, Moench.
 Poughill.
 „ *Cracca*, L.
 „ *sepium*, L.
 „ *sativa*, L.
Lathyrus pratensis, L.
 „ *macrorhizus*, Wimm.
 Ashton, &c.
Prunus communis, Huds.
 „ *domestica*, L. Binhamy.
 „ *Cerasus*, L.
Spiræa Ulmaria, L.
Agrimonia Eupatoria, L..
Alchemilla arvensis, L. Marham-
 Church.
Potentilla anserina, L.
 „ *reptans*, L.
 „ *Tormentilla*, Nest.
 „ *Fragariastrum*, Ehrh.
Fragaria vesca, L. Poughill.
Rubus, from 12 to 20 of fruti-
 cosus group.
Geum urbanum, L.
Rosa spinosissima, L.
 „ *canina*, L.
 „ *cæsia*, Sm. ? Poughill.
 „ *arvensis*, Huds.
Cratægus Oxyacantha, L.
Pyrus Malus, L. Poughill.
 „ *Aucuparia*, Gært. Poughill.
Lythrum Salicaria, L.
Peplis Portula, L. Kilkhampton.
Tamarix anglica, Webb. Bude,
 &c.
Epilobium angustifolium, L.
 Boscastle.
 „ *hirsutum*, L.
 „ *parviflorum*, Schreb.
 „ *montanum*, L. Poug-
 hill.
 „ *palustre*, L. Moorwin-
 stow.
 „ *virgatum*, Fries.
 Ashton.
 „ *tetragonum*, L. Kilk-
 hampton.
Circæa lutetiana, L. Kilkhamp-
 ton, &c.
Myriophyllum spicatum, L.
 Bude Canal, &c.
Lepigonum marinum, Wahlb.
 Coast, Bude.
- Spergula arvensis*, L.
Sedum Telephium, L. Boscastle.
 „ *anglicum*, Huds.
 „ *reflexum*, L. Marham-
 Church.
Sempervivum tectorum, L.
Cotyledon Umbilicus, L. Poug-
 hill, Boscastle.
Ribes Grossularia, L. From
 stray seeds.
Hydrocotyle vulgaris, L.
Sanicula europæa, L. Lansells,
 &c.
Eryngium maritimum, L. Bude.
Apium graveolens, L. Bude, &c.
Petroselinum sativum, Hoffm.
 Bude, &c.
 „ *segetum*, Koch.
 Poughill.
Helosciadium nodiflorum, Koch.
 „ *repens*, Koch. Bude.
Sison Amomum, L.
Carum verticillatum, Koch. Week
 St. Mary.
Pimpinella Saxifraga, L.
Oenanthe Lachenalii, Gmel. Bude.
 „ *crocata*, L.
Æthusa Cynapium, L.
Crithmum maritimum, L. Plenti-
 ful on rocky coast.
Angelica sylvestris, L.
Pastinaca sativa, L. Near Norcot
 Mouth.
Heracleum Sphondylium, L.
Daucus Carota, L.
 „ *gummiter*, Lam. Frequent
 on coast.
Torilis Anthriscus, Gært. n.
 „ *nodosa*, Gært. n.
Scandix Pecten-veneris, L.
Anthriscus sylvestris, Hoffm.
Chærophylloium temulum, L.
Conium maculatum, L. Bude.
Hedera Helix, L.
Sambucus nigra, L.
Viburnum Opulus, L. Kilk-
 hampton, &c.
Lonicera Periclymenum, L.
Sherardia arvensis, L.
Galium Aparine, L.
 „ *Mollugo*, L. Marham-
 Church, &c.

Galium verum, L.
 „ *saxatile*, L. Bude.
 „ *palustre*, L. Bude.
 „ „ *β. Witheringii*, Sm.
 Bude canal.
Rubia peregrina, L. Poughill.
Centranthus ruber, DC. Strat-
 ton and Boscastle?
Valeriana officinalis, L. Bude, &c.
Valerianella dentata, Deitr.
 Bude, &c.
Dipsacus sylvestris, L. Moor-
 winstow.
Knautia arvensis, Coult.
Scabiosa succisa, L.
Eupatorium cannabinum, L.
Tussilago Farfara, L.
Bellis perennis, L.
Solidago Virgaurea, L.
Inula crithmoides, L. Picked up
 at Tintagel, recently gathered.
Pulicaria dysenterica, Gærtn.
Bidens tripartita, L. Bude.
Anthemis Cotula, L. Bude.
 „ *nobilis*, L. Wainhouse
 Corner.
Achillea Ptarmica, L.
 „ *Millefolium*, L.
Chrysanthemum Leucanthemum,
 L.
Chrysanthemum segetum, L. Bos-
 castle.
Matricaria Parthenium, L.
 „ *inodora*, L.
 „ *maritima*, L. Bude.
Artemisia Absinthium, L. Bude
 and Trevenna.
Artemisia vulgaris, L.
Tanacetum vulgare, L. Moor-
 winstow and Trevenna.
Filago germanica, L. Poughill,
 &c.
Gnaphalium sylvaticum, L.
Senecio vulgaris, L.
 „ *sylvaticus*, L. Bude, &c.
 „ *erucifolius*, L.
 „ *Jacobæa*, L.
 „ *aquaticus*, Huds. Strat-
 ton, &c.
Carlina vulgaris, L. Bude.
Arctium majus, Schkuhr. Poug-
 hill, &c.

Arctium minus, Schkuhr. Kilk-
 hampton.
 „ *intermedium*, Lange.
 Bude, &c.
 „ *pubens*, Bab. Bude, &c.
Serratula tinctoria, L.
Centaurea nigra, L.
 „ *nigrescens*, Willd.
 „ *Scabiosa*, L.
Carduus nutans, L.
 „ *tenuiflorus*, Curt. Near
 the coast.
 „ *lanceolatus*, L.
 „ *arvensis*, Curt.
 „ *palustris*, L.
 „ *pratensis*, Huds. Week
 St. Mary.
 „ *acaulis*, L. Bude.
Lapsana communis, L.
Cichorium Intybus, L.
Hypochaeris radicata, L.
Thrincia hirta, DC.
Apargia hispida, Willd. Poug-
 hill.
 „ *autumnalis*, Willd.
 Kilkhampton.
 „ *Taraxaci*, Sm. Kilk-
 hampton.
Helminthia echioides, Gaertn.
Leontodon Taraxacum, L.
Sonchus oleraceus, L.
 „ *asper*, Hoffm.
 „ *arvensis*, L.
Crepis virens, L.
Hieracium Pilosella, L.
 „ *corymbosum*, Fr. ?
 Kilkhampton.
 „ *boreale*, Fr. ? Kilk-
 hampton.
Jasione montana, L.
Calluna vulgaris, Salisb.
Erica Tetralix, L. Week St.
 Mary.
Erica cinerea, L. Kilkhampton,
 &c.
Vaccinium Myrtillus, L. Week
 St. Mary.
Ilex Aquifolium, L.
Ligustrum vulgare, L.
Fraxinus excelsior, L.
Chlora perfoliata, L.
Erythræa pulchella, Fr. Bude.

- Erythræa Centaurium*, Pers.
Gentiana campestris, L. Boscastle.
Menyanthes trifoliata, L. Moorwinstow.
Convolvulus arvensis, L. Bude.
 " *sepium*, L.
 " *Soldanella*, L. Bude.
Cuscuta Epithymum, Murr. Bude, &c.
Lycopsis arvensis, L. Bude, &c.
Echium vulgare, L. Bude, &c.
Lithospermum officinale, L. Bude, &c.
Myosotis cæspitosa, Schultz. Bude, &c.
 " *arvensis*, Hoffm.
Solanum nigrum, L. Bude.
 " *Dulcamara*, L.
Hyoscyamus niger, L. Bude, &c.
Verbasum Thapsus, L. Bude, &c.
 " *Blattaria*, L. Tintagel.
Digitalis purpurea, L.
Antirrhinum majus, L. Stratton, &c.
 " *Orontium*, L. Bude.
Linaria Cymbalaria, Mill. Stratton.
 " *Elatine*, Mill.
 " *vulgaris*, Mill.
Scrophularia nodosa, L.
 " *aquatica*, L.
Melampyrum sylvaticum, L. Kilkhampton.
Pedicularis palustris, L. Kilkhampton.
Rhinanthus Cristagalli, L.
Euphrasia officinalis, L.
 " *Odontites*, L.
Veronica Anagallis, L. Bude.
 " *Beccabunga*, L.
 " *Chamædrys*, L.
 " *officinalis*, L. Lansells, &c.
 " *serpyllifolia*, L.
 " *arvensis*, L.
 " *agrestis*, L.
 " *polita*, Fr.
Mentha rotundifolia, L. Tintagel.
 " *piperita*, L. Bude Canal.
 " " *sylvestris*, Sol. Bude.
Mentha aquatica, L.
 " *sativa*, L., α . *vulgaris*. Poughill.
 " *arvensis*, L., α . *vulgaris*.
 " " β . *agrestis*, Sm. Bude.
Lycopus europæus, L.
Salvia Verbenaca, L. Bude and Boscastle.
Thymus Chamædrys, Fr.
Calamintha officinalis, Moench.
Scutellaria galericulata, L. Bude and Marham-Church.
Scutellaria minor, L. Week St. Mary.
Prunella vulgaris, L.
Nepeta Cataria, L. Bude.
 " *Glechoma*, Benth.
Lamium purpureum, L.
Leonurus Cardiaea, L. Bude.
Galeopsis Tetrahit, L. Poughill.
Stachys Betonica, Benth.
 " *sylvatica*, L. Poughill, &c.
Stachys palustris, L. Bude.
 " *arvensis*, L. Poughill, &c.
Ballota foetida, Lam. Bude.
Teucrium Scorodonia, L.
Ajuga reptans, L. Bude.
Verbena officinalis, L. Bude, &c.
Primula vulgaris, Huds.
Lysimachia nemorum, L. Lansells.
Anagallis arvensis, L.
 " *tenella*, L. Bude, &c.
Glaux maritima, L. Bude, &c.
Samolus Valerandi, L. Bude, &c.
Statice Dodartii, Gir. Tintagel and Bude.
Armeria maritima, Willd.
Plantago Coronopus, L.
 " *maritima*, L.
 " *lanceolata*, L.
 " *major*, L.
Salsola Kali, L. Bude.
Chenopodium album, L.
Beta maritima, L. Bude.
Atriplex angustifolia, Sm.
 " *erecta*, Huds. Bude, &c.
 " *deltoidea*, Bab. Marham-Church.

- Atriplex Babingtonii*, Woods.
 Bude.
Rumex sanguineus, L.
 „ *obtusifolius*, L.
 „ *crispus*, L.
 „ *acetosa*, L.
 „ *Acetosella*, L. Poughill.
Polygonum lapathifolium, L.
 Stratton.
 „ *Persicaria*, L.
 „ *mite*, Schrad.
 „ *Hydropiper*, L.
 „ *aviculare*, L.
 „ *Raii*, Bab. Bude.
 „ *Convolvulus*, L.
Fagopyrum esculentum, Moench.
 Stratton.
Euphorbia Helioscopia, L.
 „ *Paralias*, L. Bude.
 „ *Peplus*, L.
 „ *exigua*, L.
Mercurialis perennis, L.
Callitriche verna, L.
 „ *platycarpa*, Kütz.
 Poughill.
Parietaria officinalis, Sm. Bos-
 castle.
Urtica urens, L. Bude.
 „ *dioica*, L.
Humulus Lupulus, L. Poug-
 hill, &c.
Ulmus suberosa, Ehrh.
Salix fragilis, L. Bude.
 „ *alba*, L. Bude.
 „ „ *γ. vitellina*, Sm. Poug-
 hill.
 „ *Smithiana*, Willd.
 „ *acuminata*, Sm. Poughill.
 „ *cinerea*, L.
 „ „ *β. aquatica*, Sm.
 „ „ *γ. oleifolia*, Sm.
 „ *aurita*, L. Kilkhampton.
 „ *Caprea*, L. Lansells.
 „ *laurina*, *β. tenuifolia*? L.
 Week St. Mary.
 „ *fusca*, L. (Sm.) var. *β.* Week
 St. Mary.
 „ „ *γ. prostrata*, Sm.
 Near Red Post.
Populus alba, L. Trevalga.
 „ *tremula*, L. Bude.
 „ *nigra*, L. Stratton, &c.
- Betula glutinosa*, Fr. Stratton, &c.
Alnus glutinosa, Gaertn. Strat-
 ton, &c.
Fagus sylvatica, L. Poughill.
Castanea vulgaris, Lam.
Quercus Robur, L.
Corylus Avellana, L.
Tamus communis, L.
Orchis maculata, L. Moorwin-
 stow.
Iris Pseud-acorus, L.
Convallaria majalis, L. Bos-
 castle.
Allium Schoenoprasum, L. Tin-
 tagel.
Narthecium ossifragum, Huds.
 Week St. Mary.
Juncus maritimus, Sm. Bude.
 „ *effusus*, L.
 „ *conglomeratus*, L.
 „ *glaucus*, Sibth.
 „ *lamprocarpus*, Ehrh.
 „ *nigritellus*, D. Don.
 „ *bufonius*, L.
Luzula pilosa, Willd. Poughill.
 „ *multiflora*, Lej. Poughill.
Alisma Plantago, L.
Triglochin palustre, L. Bude.
Typha latifolia, L. Bude Canal.
Sparganium ramosum, Huds.
Arum maculatum, L.
Lemna minor, L.
Potamogeton natans, L. Canal.
 „ *oblongus*, Viv. Kilk-
 hampton.
 „ *crispus*, L.
 „ *pusillus*, L.
Zostera marina, L. Bude.
Cladium Mariscus, R. Br. Moor-
 winstow.
Eleocharis palustris, R. Br.
Scirpus maritimus, L. Bude
 Canal.
Scirpus lacustris, L. Bude, &c.
 „ *setaceus*, L. Bude, &c.
 „ *Savii*, S. & M. Bude, &c.
Eriophorum angustifolium, Roth.
 Moorwinstow.
Carex arenaria, L. Bude.
 „ *vulpina*, L.
 „ *muricata*, L. Poughill.
 „ *remota*, L.

- Carex stellulata*, Good. Moorwinstow.
 „ *vulgaris*, Fr. Week St. Mary.
 „ *panicea*, L.
 „ *glauca*, Scop.
 „ *Oederi*, Ehrh. Moorwinstow.
 „ *fulva*, β . *Hornschuchiana*, Hoppe. Moorwinstow.
 „ *sylvatica*, Huds. Bude, &c.
Phalaris canariensis, L. Bude, &c.
 „ *arundinacea*, L. Bude, &c.
Anthoxanthum odoratum, L.
Phleum arenarium, L. Bude.
 „ *pratense*, L.
Gastridium lendigerum, Gaud. Marham-Church.
Agrostis canina, L. Boscastle.
 „ *vulgaris*, With.
 „ *alba*, L.
Psamma arenaria, R. and S. Bude.
Phragmites communis, Trin.
Aira cæspitosa, L.
 „ *caryophyllea*, L.
 „ *præcox*, L.
Avena fatua, L. Poughill.
Arrhenatherum avenaceum, Beau.
 „ „ *avenaceum*, β .
bulbosum, Lindl. Stratton.
Holcus lanatus, L.
 „ *mollis*, L.
Triodia decumbens, Beauv.
Molinia cærulea, Moench. Week St. Mary.
Poa annua, L.
 „ *pratensis*, L.
Glyceria fluitans, R. Br.
 „ *plicata*, Fr. Bude.
Sclerochloa rigida, Link. Marham-Church.
 „ *lohiacea*, Woods. Bude, &c.
Briza media, L.
Cynosurus cristatus, L.
Dactylis glomerata, L.
Festuca bromoides, L. Bude.
 „ *ovina*, L.
 „ *rubra*, L.
 „ *sylvatica*, Vill. ? Lansells.
 „ *gigantea*, Vill. Marham-Church.
Bromus asper, L.
 „ *sterilis*, L. Bude.
Serrafalcus commutatus, Bab.
 „ *mollis*, Parl.
 „ „ β . *velutinus*.
 Bude, Tintagel.
Brachypodium sylvaticum, R. and S.
Triticum repens, L.
 „ „ β . *littorale*, Bab. Bude.
Triticum junceum, L. Bude.
Lolium perenne, L.
 „ *italicum*, A. Braun. Bude, &c.
 „ *temulentum*, L., β . *arvense*, With. Kilkhampton.
Nardus stricta, L. Week St. Mary.
Equisetum arvense, L.
 „ *Telmateia*, Ehrh. Poughill.
 „ *limosum*, L. Bude.
 „ *palustre*, L.
 „ „ γ . *nudum*, DC. Bude.
Polypodium vulgare, L.
Lastrea Filix-mas, Presl.
 „ „ *Borreri*. Poughill.
 „ *spinulosa*, Presl. Kilkhampton.
 „ *glandulosa*. Poughill.
 „ *dilatata*, Presl.
 „ *Foeniseii*, Wats.
Polystichum angulare, Newm.
Athyrium Filix-fœmina, Roth.
Asplenium lanceolatum, Huds. Boscastle, &c.
 „ *Adiantum nigrum*, L.
 „ *marinum*, L. Tintagel, Bude.
 „ *Ruta-muraria*, L. Marham-Church.
Scolopendrium vulgare, Sym.
Blechnum boreale, Sw.
Pteris aquilina, L.
Osmunda regalis, L. Side of Tamar.
Adiantum Capillus-Veneris, L. Boscastle.
Chara vulgaris, L. Poughill.
 „ *fragilis*, Desv. Bude.

It is not necessary to particularise the plants in the above list which occur through cultivation or as agricultural weeds. A few, however, occur in localities so open to suspicion, that their appearance is more probably owing to intentional planting than to accident, *e.g.*, *Corydalis lutea*, *Saponaria officinalis*, *Convallaria majalis*, and in the Boscastle station, *Centranthus ruber*. *Petroselinum sativum* occurs in several neighbourhoods; not as usual on old walls, but on hedge-banks. Many plants of common occurrence elsewhere have not been observed; of these not a few will reward the search of future investigators. To any one able to visit the neighbourhood in spring and early summer an opportunity will be afforded of enlarging the above list. *Allium Schoenoprasum* has been inserted on the authority of Babington's Manual. It is as well to correct two mistakes in one of the local guide books, which gives *Trifolium stellatum* for *T. arvense* at Tintagel, and *Asplenium Trichomanes* for *A. Adiantum nigrum* in the porch of Moorwinstow Church. A very few species have been set down in doubt, which are of course open to correction.

ON THE BLUE RE-ACTION GIVEN BY IODINE IN CERTAIN FUNGI.

BY WILLIAM PHILLIPS.

THE great advantages derived from chemical tests in the classification and study of Lichens, first noticed by Dr. Nylander, of Paris, and subsequently adopted by the Rev. W. A. Leighton in his "Lichen Flora of Great Britain," has led to the idea that a similar use of chemical tests may be made in the study of Fungi; but up to the present time nothing, as far as I am aware, has been recorded in the way of a systematic application of any test, nor does there exist much evidence from actual experiment to show that help can be looked for from this source. The opinion prevalent amongst botanists up to a comparatively recent date that Fungi are totally devoid of starch may have tended to check the use of iodine as a test; yet there can be little doubt that a blue reaction can be obtained in many species of Fungi with this re-agent, which have never been supposed capable of giving any, owing either to the presence of starch in solution, or to the substance known as *cellulose*. Schacht indeed has observed that "the mycelium of a small mould fungus became clear blue under the action of iodine," and Mr. F. Currey in the Proceedings of the Royal Society (Jan. 28, 1858) has recorded his observations on a blue reaction with iodine in a *Tuber*, which he in consequence named *Amylocarpus encephaloides*. In the same paper he refers to the fact of M. Tulasne having stated that "in several species of *Erysiphe* the tips of the radicular appendages are tinged blue by a solution of iodine and that the same effect is produced in the matter contained in the summits of the asci and upon the mucous envelope of the sporidia of several species of *Sphæria*." Dr. Nylander also points out the fact ("Flora," Oct. 10, 1865) that certain species of *Pezizæ* are affected by iodine in a similar manner, viz., *P. Polytrichii*, Schum., *P. cochleata*, Huds.,

P. violacea, Pers., in which the "*gelatina hymenia*" becomes blue, and *P. firma*, Pers., *P. plumbea*, Fr., *P. juncigena*, Nyl., *P. undella*, Fr., *P. cerea*, Sow., and *P. repanda*, Wahlenb., in which the thecae alone, especially the apices, turn blue. It appears, therefore, that there is hope of some useful results in the determination of certain species of fungi from a more continuous and systematic application of this test; but should we be disappointed in this expectation enough of interest attaches to the subject to warrant further investigation.

Impressed with these ideas I have taken occasion during the past year to apply iodine to the hymenium of all the *Pezizæ* which have passed through my hands in a fresh state, for when dry no reaction is obtained, and I give the result below.*

The common tincture of iodine as obtained at the shops, diluted to one-half with spirits of wine, appears to be the most suitable strength. A drop of this being placed on a glass slide with a thin section of the hymenium and subjected to light pressure under a magnifying power of 300 to 400 diameters will at once show if there be any reaction. The shade of blue obtained varies very much, from a light cerulean to a dark Prussian blue. The parts of the hymenium affected also vary; in some species the *tips* of the paraphyses only, in others the *summits* of the asci only, assume the blue colour, while in a few instances the mucous matter enveloping the asci and paraphyses is alone affected. I have taken no notice of a vinous brown tint which is occasionally observed, because it appears to me to arise from a greater or less readiness of the parts to imbibe the liquid, and hence to become of different degrees of density.

- Peziza badia*, P. Summits of asci pale blue.
- P. succosa*, Berk. Summit of asci blue.
- P. aurantia*, Fr. No reaction.
- P. repanda*, Wahl. Apices of asci and "*gelatina hymenia*" blue.
- P. trachycarpa*, Curr. The "*gelatina hymenia*" faint blue.
- P. cupularis*, L. No reaction.
- P. rutilans*, Fr. Tips of paraphyses deep purple blue.
- P. melaloma*, A. and S. No reaction.
- P. subhirsuta*, Schum. Tips of paraphyses blue.
- P. hemisphærica*, Wigg. No reaction.
- P. hirta*, Sch. No reaction.
- P. trechispora*, B. and Br. Tips of paraphyses deep purple blue.
- P. vitellina*, Pers. Tips of paraphyses deep purple black.
- P. scutellata*, L. Tips of paraphyses deep purple black.
- P. livida*, Sch. No reaction.
- P. ciliaris*, Schrad. No reaction.
- P. virginea*, Batsch. No reaction.
- P. calycina*, Schum. No reaction.
- P. bicolor*, Bull. No reaction.
- P. cerina*, P. No reaction.
- P. apala*, B and Br. No reaction.

* As I intend to continue this investigation on every species of *Peziza* I can obtain fresh, I shall feel indebted to any reader of this Journal who will do me the favour of forwarding to my address by post any species not named in my list. Address—Canonbury, Kingsland, Shrewsbury.

P. firma, Pers. No reaction. (Dr. Nylander obtained a reaction in this species.)

P. echinophila, Bull. No reaction.

P. coronata, Bull. No reaction.

P. inflexa, Bolt. No reaction.

P. cinerea, Batsch. No reaction.

P. resinæ, Fr. Asci beautiful cobalt blue.

NOTE ON ERANTHEMUM ELATUM.

By S. KURZ.

IN a letter to the late lamented Dr. Seemann (*cf.* Journ. Bot. 1872, p. 46.) I have remarked on dimorphism in *Eranthemum elatum*, a plant which has puzzled me for a long time in a similar way to the dimorphic-flowering, and at the same time dimorphocarpous, *Gardenia erythroclada*, Kurz (*cf.* Journ. As. Society Beng., part iv., 1872). I unfortunately overlooked a short note on dimorphism in *Eranthemum cinnabarinum* in a list of cultivated *Acanthaceæ*, published by Dr. Anderson in the Journal of the Agri-horticultural Society of Bengal for the use of horticulturists. This omission was pointed out by Mr. John Scott in this Journal (1872, p. 161). Mr. Scott expresses his surprise that I should have for such a long time overlooked these "by no means inconspicuous phenomena" in *Eranthemum*: the surprise is at present rather on my side in learning that he—although long enough resident in Sikkim, where *E. crenulatum* is by no means unfrequent—should have overlooked the whole plant, and thus have remained quite in darkness as to its habits in indigenous habitats (*l.c.* 162.) In my letter I stated that "I saw only fruits," and a few lines further on, "Again I saw nothing but fruits." However, in spite of these remarks, Mr. Scott thought it desirable to introduce a supposition to which I shall refer in the sequel.

Thus so far from my remarks on the generic question—in absence of flowers then—standing in any connection with dimorphism, it was the very ample long-peduncled panicle as alluded to by me (more that of an *Asystasia*) which misled Dr. Anderson; while I, relying more upon general structure, thought it *Eranthemum*, but giving way to Dr. Anderson's arguments, I put it in the genus *Asystasia*, without, however, describing it. It so happens that what deterred Dr. Anderson, and subsequently also me, from accepting the plant as an *Eranthemum*, has now quasi-identified it with *E. crenulatum*—*E. latifolium* (*Justicia latifolia*, Vhl., *E. palatiferum*, NE., &c.), probably because I myself indicated its too near affinity with *E. crenulatum*. However, some good often accrues from a misconception, and Mr. Scott—although unknowingly—has given me the key to physiological differences. I have stated that I found the large flowers once only, and I may now add that this was at an unusual hour. In the last days of March (hot season) I had pitched my camp at one of the feeders of the headwaters of the Swachoung (eastern slopes of the Pegu Yomah), and early the next morning I rambled about and found there

a group of *E. elatum*, of which nearly all had cast their large corollas (then lying on the ground), and only a single specimen remained just in the act of shedding them; indeed in plucking the plant only a very few of them stood the shock. This of course has nothing to do with floral diurnal movements, and still less so with atmospheric conditions,* as Mr. Scott supposes, but with the deciduousness of the corollas themselves. Mr. Scott declares that the large sterile flowers of *Eranthemum* retain their beauty for two or three days even when fertilised; such can hardly be the case in *E. elatum*. It reads strange, indeed, that the large flowers and their buds, but not the long styles of *E. elatum* should regularly have escaped my notice, while I never missed those of the small-sized *E. crenulatum*, which often enough grows in company with it, and in Martaban it seemed to be the only species. However, in arguing thus I state only what happened to me; others may be more fortunate in their observations.

I now return to Mr. Scott's supposition, and will examine how far his views agree with those of a systematic botanist. He says: "He (Dr. Anderson) might well have discarded it from *Eranthemum*, and taken it even as the representative of a new genus, one which assuredly would thus have had considerably better claim to acceptance than could be shown, for example, in the suggested transposition of *E. Ecbolium*." This assertion is taken up by Mr. Scott in his preliminary record of facts. Not to increase synonymy we shall call *E. elatum* for the present *X.*, and take *Eranthemum* and its allies as a basis. We then get the following essential points for estimation:—

Eranthemum: Shape of corolla; capsules four—rarely by abortion two—or one-seeded; bracts small or minute; dimorphism.

Genus *X.*: Shape of corolla; supposed non-dimorphism; rest as in *Eranthemum*.

Asystasia: Shape of corolla; non-dimorphism; rest as in *Eranthemum*.

Ecbolium: Shape of corolla; non-dimorphism; capsules permanently two-seeded†; bracts large and leafy.

Now from such an exposition it is evident, or to speak in Mr. Scott's own style, most decidedly evident, that the genus *X.* in its intrinsic value=*Asystasia*, a generally-adopted genus; while the ill-fated *Ecbolium*, with its additional characters, must have in the eyes of a systematist "considerably better claim to acceptance" than Mr. John Scott thought it to possess. It has happened to a leading botanist to make a new species of *Eranthemum* out of *Asystasia Neesiana*, but I feel sure it would not be easy to have it put in *Ecbolium*. Add to this that the great Nees von Esenbeck is the true originator of this genus, and I believe that Mr. Scott will find few partisans for his assertion. The genus *Eranthemum* as revised by Dr. Anderson in his enumeration of Indian *Acanthaceæ*, comprises three very different elements, viz. (1) *Ecbolium*, (2) *Eranthemum* proper, (3) *Rhinacanthus* (*Eran-*

* *E. elatum* and *E. latifolium* are shade-loving hygroclicatics, hence they retreat in excessiveclines, as Burma, &c., to the evergreen tropical forests, where they enjoy during the dry season a tolerably equable dampness, only the temperature varying considerably.

† By some mistake the "capsules" instead of cells are said in my paper (Journ. As. Soc. Beng., vol. 40, p. 75.) to be one-seeded.

themum paniculatum, T. And., identical with *Rhinacanthus calcaratus*, NE.)

I now append the description of *ERANTHEMUM ELATUM*, Kurz, in Journ. Bot. 1872, p. 46.—Herba perennis, 2—3½ pedalis glaberrima v. caulibus apice parce tomentellis; folia larga, elliptico-adlato-lanceolata, basi in petiolum 1—2 pollicarem decurrentia, brevè acuminata, crasse membranacea, glabra v. subtus in nervis sparse puberula, siccando subglaucescentia, 3—5 poll. longa; flores brevissime pedicellati, pentamorphi, secundo-racemosi, in paniculam terminalem amplam 1—1½ pedalem laxam glabram dispositi; calicis glabri lobi lineares 2 lin. longi; corollæ florum sterilium conspicuæ; majores cyaneæ tubo 1—1½ poll. longo, lobis ½ poll. circiter longis; minores dimidio breviores cæterum prioribus conformes; corollæ florum fertilium trimorphæ; aliæ minimæ clausæ alabastriformes cum tubo basi inflato; aliæ paullo majores apertæ uti in hocce diario l.c. descriptæ; aliæ 3 lin. longæ v. paullo longiores apertæ limbo tubi non efflati longitudine; capsula et semina *E. latifolii*.

Hab.: Pegu Yomah, on siliceous permeable sandstone, especially in evergreen tropical and in damp deciduous forests (upper mixed forests) along torrents. *Fl.* during dry season.

SHORT NOTES AND QUERIES.

CAREX PUNCTATA, Gaud., IN SCOTLAND.—May I request the favour of your making known a discovery which will doubtless interest many of your readers? In the course of a botanical ramble with my friend the Rev. Mr. Farquharson, of Selkirk, in my parish, Colvend, during the autumn of 1872, we had the good fortune conjointly to discover what turns out to be *Carex punctata*. Colvend lies along the northern shore of the Solway Firth, immediately opposite Maryport and Whitehaven, and in the Stewartry of Kirkcudbright. The parish contains many interesting and rare plants,* but the only ones which, as having relation to *C. punctata*, I would mention are *C. distans* and *C. extensa*, both of which grow abundantly along the muddy shores of our coast. On first noticing *C. punctata* we both agreed at once that it resembled, but was distinct from, *C. distans*. And a careful examination satisfied Mr. Farquharson and myself that it was in truth *C. punctata*, even before we submitted specimens to those who had more knowledge and larger means of comparison than we had—to yourself among others. The plant grows in sandy and muddy soil, where it is reached by the spray of the sea, but not, so far as we observed, where it is overflowed at any time by the tide. The other two Carices, *C. distans* and *C. extensa*, on the other hand, often grow where the tide at times reaches and even overflows them. It is true that *C. punctata* is found at no great distance from *C. distans*, to which it is most nearly allied; but whether or not it grows in close

* See a paper by Mr. P. Gray in the "Phytologist" for 1848, p. 348.—[Ed. Journ. Bot.]

proximity to it I have not yet had time to observe. I may further add that after having discovered it once, we found it again in two or three places along the coast, some miles distant from the place of first discovery. The perigynia in their fresh state were beautifully dotted all over, thus supplying to the plant its specific name, *punctata*.—

JAMES FRASER.

Mr. Fraser's specimens are clearly identical with Irish *C. punctata* collected by Mr. A. G. More, and with Professor Babington's Guernsey plant (in the British Museum) from Vazon Bay. As this latter station has been called in question, it is satisfactory to be able to speak with certainty about it, though, as in the Scotch localities, *C. distans* is its companion, and has been mislabelled *C. punctata*. The species has been recorded in three localities in England—Cornwall, Anglesea, and Cumberland. Mr. Baker informs me that Mr. Westcombe's plant from the first county, of which a few perigynia are in Boott's herbarium, is the right thing, and that there is a good specimen from Beaumaris, collected by Wilson, in Herb. Kew. In this station also *C. distans* grows along with it. The Cumberland station, near Whitehaven, was afterwards (Phytologist iv., p. 679) denied; but it would be worth re-investigation, being just opposite Mr. Fraser's localities. At all events we now know *C. punctata* in Great Britain from three counties at considerable distances from each other—Cornwall, Anglesea, Kirkcudbright; besides the Irish stations in Co. Cork and Kerry, and the Isle of Guernsey. Other localities in the West will probably be discovered for this plant, which is not difficult to distinguish, and is maintained as a species even by Mr. Bentham in his "Handbook." An exhaustive illustration is given in Dr. Boott's great work on *Carex*, vol. iv., t. 500; the plant is also figured in Syme's "English Botany," vol. ix., t. 1671.—HENRY TRIMEN.

EPILOBIUM ROSMARINIFOLIUM, *Haenke*.—It seems desirable again to direct attention to this plant, which was first announced as a native of Scotland in the "Prospectus of the (unpublished) Flora Perthensis" of the late Mr. John Robertson. Of this prospectus there were two issues—one in 1852, and the other in 1854. The fullest notice of this plant is contained in the former. After giving the specific character Mr. Robertson says:—"This very distinct species, hitherto only known as a native of the Swiss Alps, we discovered in 1845, while searching for the rare *Bartsia alpina*, on the most inaccessible rocks that overhang the Tarf, a wild mountain stream in Glen Tilt, Athole. It may be readily overlooked, from the frequent nibbling of sheep and other animals that with avidity here browse on almost every herb. It has also been observed in one or two situations by the Tay, where, doubtless, it has been carried, like *Erigeron alpinus*, *Saxifraga aizoides*, and some of the alpine *Veronica*, to a lower level, by the impetuosity of the mountain torrents.—J. R." My specimens are from the banks of the Tay, and were gathered by Mr. Robertson. I noticed the plant in my paper upon *Epilobia* (Ann. Nat. Hist. Ser., 2., xvii., 317), and said that the late Mr. Borrer concurred with me in believing the statement of Mr. Robertson, although it was treated rather contemptuously by Messrs. Hooker and Arnott in the 'British Flora.' He was

considered by others in Scotland as a truthful man. I am informed by Professor Balfour that his papers cannot now be found. In all probability no person has hunted for it by the Tarf of late years, but surely it is desirable to do so; and may we not look for this work from some Edinburgh botanist?—C. C. BABINGTON.

PLANTS OF CO. CORK.—*Carex punctata*.—This rare species has been found in a new station at Ardgroom by Mr. A. G. More recently. This locality, like those on the shores of Bantry Bay, at Glengariffe, and Castletown, Bearhaven, is in the extreme west of the County Cork. Last summer, when botanising by the shore at Oysterhaven, I found a considerable tuft of the same species growing near the edge of the water. This station is interesting as extending the range of a very rare species to a point quite forty miles east of the previously recorded localities. As a new station for another rare plant, I may name this for *Cicendia filiformis*—damp and waste ground near the shore at Durrus, at the head of Dunmanns Bay.—T. ALLIN.

IPECACUANHA CULTIVATION IN INDIA.—Mr. J. Gammie writes (Nov. 17, 1872) to Dr. Hooker, from Darjeeling:—"The Cinchona and Ipecacuanha plants are still in a thriving state. Of the latter we have about 3000, so that as far as the propagation is concerned there is no hitch; but I fear we shall have to try many experiments yet before we can finally decide on the best place for its cultivation. We have planted out about forty plants at different elevations and under different conditions; but we must get over a dry season before an opinion as to the best place for them can be hazarded. In the meantime I think that it will succeed best on well-drained slopes on which there is a good coating of vegetable soil and dense natural shade."

BUDS OF MALAXIS.—Professor Dickie, in his note on the buds developed on the leaves of Malaxis read at the Linnean Society and noticed in your last number, states "that a close resemblance is to be traced between these buds and the ovules of some of our native orchids, e.g. *Habenaria viridis*," and further, "the case of Malaxis indicates the ovule to be homologous with the bud, the nucleus-like body corresponding with the axis and the cellular open-mouthed sac to an embracing leaf." If by the study of their development Prof. Dickie has decided that the ovule and the bud are homologous, then he will enable us to solve the disputed question whether the ovules of orchids are Trichome or Phyllome structures. Hofmeister in his "Neue Beitræge zur Kenntniss der Embryobildung der Phanerogamen, II. Monokotyledonen," p. 653, *et seq.*, states that the ovules of orchids develop from single epidermal cells, and are therefore Trichomes or modified hairs. Sachs seems to give a qualified adherence to this statement in his "Lehrbuch," ed. ii., p. 475; while Strasburger, "Die Coniferen und die Gnetaceen," p. 421, combats the view of Hofmeister, and states that from his own observations he has found the ovules to arise not from epidermal cells, but by transverse division of a cell lying *under* the epidermis, and as development proceeds the epidermis is pushed up, forming the external cells, while the original cell from under the epidermis forms the central row of cells of

the young ovule. If the buds and ovules are homologous structures they must have the same mode of origin, and will develop either from single epidermal cells (which is in the highest degree improbable) or from deeper cells. I suspect that there is only an *analogy* between the buds and ovules, the buds being ordinary adventitious buds, while the ovules are either leaf structures or normal (not adventitious) buds.—W. R. McNAB.

ON DIMORPHIC FLOWERS OF *CEPHAELIS IPECACUANHA*.—I have already stated that the plants in the Botanic Garden (Edinburgh) have been derived from two sources—one from a plant sent by Sir William Hooker more than forty years ago, and which he had procured from Mr. M'Koy of Liege; the other from plants sent from Rio Janeiro by Dr. Gunning. There is an apparent difference in the characters of the plants from these two sources, but not such as to amount to a specific distinction. Hooker's plant has flowered pretty freely, but never produced fruit until last year, when the pollen was artificially applied from one flower to another. All the plants from this source have long stamens and short styles. The plants sent by Dr. Gunning have grown well, but it is only recently that they have flowered, and now there are several specimens in flower, and some are fruiting after artificial impregnation. In this series of plants there are evident dimorphic flowers. In some the stamens are long and the style is short; while in others the style is long, projecting much beyond the corolla, while the stamens are short. It would appear that successful fertilisation may be effected by applying the pollen from the long stamens to the stigma of the long styles. The partial fruiting which took place in the heads of flowers in the Hookerian plants may have depended on the fact that there were only produced flowers with long stamens and short styles, and although when pollen was applied from one flower to another fertilisation was effected, still it was by no means fully successful, only two or three of the flowers in the head producing fruit. The flowers are sweet-scented with a delicate odour.—J. H. BALFOUR, in *Proc. Roy. Soc. Edinburgh*.

"TYLOSES" (vol. x., p. 377).—The origin of the word *Tyloses* is not far to seek. It should, however, be written *Tylosis*: *τύλη* and *τύλος* both mean any swelling or enlargement, and *τύλωσις* "a making or becoming swollen or protruded." The enlarged and protruded cells referred to by Professor Dyer and Dr. McNab cannot with any propriety be called *Tyloses*, although *Tylosis* is a very good word to express their abnormal condition. With regard to the three German words mentioned by Dr. McNab, it is difficult to speculate as to the origin of "thyllen." It may have been manufactured from *τύλη*, but the resemblance is somewhat remote. "Tülle" means, as Dr. McNab has remarked, a "socket," but I very much doubt whether it can be used in the sense of a "nozzle" or projection. "Füllzellen" would mean simply "cells filling a cavity," which is exactly what the cells in question do. It is to be hoped that this word may be adopted to the exclusion of the other two.—FRED. CURREY.

The following is an extract from a note which I received to-day from one of my pupils, which may explain the term:—

“*τύλος* is the Greek for a ‘knot’; the verb from it (*τυλόω*) = ‘to make callous,’ then = to ‘grow hard’ or ‘callous,’ and also to get ‘knotted’ or ‘knobbed.’ Your word *Tyloses* is pure Greek, *τύλωσις*, used by Galen for ‘a becoming callous.’ As to the derivation, the whole thing is from *τύλη*, which means, first, a lump, and is connected with the Sanskrit *tu*, *tāumi* (to grow, increase), and Latin *tuber*, *tumeo*, *tumulus*. By some freaks of Grimm’s law this word gets mixed up with another Greek set of words, *μολ(λ)ύομαι*, to get hardened (a similar meaning), and then with *μύλη*, which means (1) a hard thing, (2) a millstone, (3) a mill (Latin *mola*; English, mill). The ‘*tye*’ form of the root does *not* exist in Latin. The meaning appears to be either the filling up and hardening of the vessel by the cells, or the cells coming through the vessel ‘like iron knots on a club’ (which is a Greek use of the word *τύλος*).” Since my attention was directed to *Tyloses* by Mr. Dyer’s paper in the Journal for November, I have seen it in the stems of many plants, especially in those having an open structure, such as the *Bignoniaceæ*, &c.—JOHN SADLER.

Extracts and Abstracts.

ANATOMICAL OBSERVATIONS ON THE COTYLEDON OF GRAMINEÆ.

BY PH. VAN TIEGHEM.

THE author in endeavouring to trace the anatomical passage from the main root to the stem in Monocotyledons was forced to study the mode of insertion of the first leaf in Grasses, and here gives the results of his investigations.

The anatomical details are prefaced by a full account of the opinions held by different writers as to the nature of the parts of the embryo in Grasses. For these parts the author purposely employs terms which do not convey any opinion of their nature. He calls that portion of the embryo applied to the albumen, and having for its function its liquefaction and absorption, the *scutellum* (*écusson*), a term used by Gaertner and subsequent authors, and derived from the form of the organ. With Mirbel the little tongue opposite to the scutellum is called the *lobule*, and the covering of the gemmule the *pileola*. The views of various botanists are summed up as follows:—

“In the first view the scutellum is the whole cotyledon; the opposite lobule is a second independent leaf; the pileola a third leaf at 180 degrees to the second; and so the first green leaf of the plant is its fourth appendage (Malpighi, Mirbel, Poiteau, Turpin, &c.)

“In the second, the scutellum is still the cotyledon, but the lobule is a portion of it; the pileola is the second leaf of the embryo; and the first green leaf is the third leaf of the plantlet (Schleiden, Schacht, Decaisne, &c.)

“In the third, it is the pileola which represents the whole cotyledon, the scutellum and lobule being merely expansions of the caulicle or radicle; the first green leaf is here the second appendage of the plant

(L. Cl. Richard, A. de Jussieu, Lestiboudois, Hofmeister, Sachs, &c.)

“The fourth view refers to the cotyledon all those parts which the three former give it singly. The scutellum is the middle part of the cotyledon, the lobule an opposite appendage to it, and the pileola its ascending sheath: these three organs together forming a single cotyledonary leaf. The first green leaf is thus the second appendage of the plant (Gaertner, Mirbel at one time).

“To each of the first three solutions a radical objection may be made. 1. The lobule opposite the scutellum can scarcely be considered as an independent leaf unless it receives from the axis a vascular bundle, and it is easy to satisfy oneself that this is not the case. Besides, the lobule is wanting in many cases. 2. The scutellum with its opposite ligule (when it exists) being considered to be the cotyledon or first leaf, if the pileola is a second independent leaf, it should follow, in accordance with all known cases, that there should be a certain divergence between the two leaves; but the sheath is exactly superposed to the scutellum. 3. It can only be correct to call the scutellum a lateral outgrowth of the caulicle or radicle in one of these cases—either the excrescence is purely parenchymatous and results from a mere local excess of the cortical parenchyma, or it is vascular, the bundles which it receives forming a loop (‘anse’), and after proceeding upwards in it, bending down to the base to pass back into the stem or root and continue their vertical course. But it is easy to determine that the scutellum possesses a vascular system which after it has once entered is distributed without afterwards making any return to the stem or root.”

Struck by these objections, the author determined to seek a new basis for the solution of the problem by the investigation of the vascular system in germinating plantlets, and details the results of his dissections of those of *Stipa pennata*, Wheat, Barley, *Lolium italicum*, *Zea Mays*, *Sorghum vulgare*, *Coix Lacryma*, &c. The following are his conclusions:—

“The cotyledon of Grasses presents in all the plants of the family the same fundamental characteristics and the same essential relationship to the stem. It is always formed of—1. A hypogeal limb, more or less sheathing and one-nerved (scutellum, hypoblast), the opposite side of the sheath of which often forms a little tongue or ‘collerette,’ free and entirely cellular (lobule, epiblast); 2. A double stipule, united edge to edge in front and behind, to form a white epigeal sheath, which protects the plumule (pileola). This bistipular sheath possesses two fibro-vascular bundles, which are in fact the lateral branches of the bundle to the whole cotyledon, of which the nerve in the scutellum is the central branch. Usually barren, the cotyledon so formed bears in certain cases, like the subsequent leaves, an axillary bud, more or less displaced, situated in the axil of its bistipular sheath, or even two collateral buds.

“With regard to its mode of insertion, the cotyledon of Grasses presents three anatomical modifications. Either the cotyledonary node is very short and the sheath is inserted immediately above the scutellum (*Triticum*, *Stipa*, *Secale*, *Hordeum*, *Ægilops*, &c.), or the cotyledonary node is elongated by an interposed growth. Of this

condition there are two varieties. First, the growth may occur in the lower part of the anatomical connection: the sheath is then separated from the scutellum, but remains connected with it, through the cortical parenchyma of the node, by a fibro-vascular bundle with external vessels which we may regard as formed by the union of the two lateral branches of the cotyledonary bundle* (*Lolium*, *Bromus*, *Agrostis*, *Alopecurus*, *Phalaris*, *Oryza*, &c.). Or, second, the interposed growth may take place in a part of the connection situated higher up: the sheath is then still separated from the scutellum by a long interval, but without preserving its vascular connection with it through the cortical tissue, and one may readily believe that it has an independent insertion on the stem (*Zea*, *Panicum*, *Eleusine*, *Sorghum*, *Coix*, &c.)

“Such is the result of anatomical investigation of grass-plantlets. If we look at the matter historically we see that it is nearly the way in which Gaertner seems to have understood the complex nature of the cotyledon, though he has not given any definite explanation, and his useless idea of a *vitellus* throws such a confusion over the subject that one has some difficulty in extracting his real views. Other observers seem to have detected only a portion of the truth. The scutellum is certainly the cotyledon, as Malpighi, Mirbel, &c., admit; but it is not the whole cotyledon, even if one unites with it, as do Schleiden, Schacht, &c., the little opposite tongue. The pileola is also the cotyledon, as is held by L. C. Richard and his followers, but neither is it the whole cotyledon. The scutellum with its opposite lobule (when it exists) and the pileola are two portions of the same leaf, the cotyledon of the plant. Thus vanish those objections which rendered all partial solutions inadmissible.

“*Comparison of the cotyledonary leaf with the other leaves of the plant.*—The composition of the cotyledonary leaf in Grasses being now well understood, let us endeavour to correlate it with the other appendages of the plant, especially with the ordinary vegetative leaf, and with the leaf of origin of the flower branch (‘*feuille mère du rameau floral*’).

“The ordinary vegetative leaf of a Grass is made up of a sheath, a blade, and a ligule inserted at the point of junction of the sheath and blade. This last part is usually little developed, without chlorophyll or stomata, and entirely parenchymatous; but in some cases, as M. Duval-Jouve has recently shown in *Psamma arenaria*, it attains 4 centimètres (about $1\frac{1}{2}$ inches) in length, and possesses lateral nerves alongside of which are found chlorophyll and stomata. Here the ligule well represents a double axillary sheathing stipule. Of these three constituent parts the sheath is formed last, and it is produced by an interposed growth which elevates the blade and ligule.

“Compared with the vegetative leaf, the cotyledonary one is seen to be deprived of sheath—that is, of that part which is produced latest by a rapid multiplication of cells at the very base of the organ. It undergoes an arrest of development. Its sessile blade elongates itself but little, and is modified to form the scutellum; but on the other hand, its ligule, also sessile, attains dimensions greater than

† This mode is elsewhere stated to be that found in the majority of Grasses, also in *Cyperaceæ* and some other Monocotyledons.—[Ed. *Journ. Bot.*]

those in the vegetative leaves of most Grasses, and of a kind similar to the ligule of *Psamma arenaria*; it is provided with two lateral nerves, alongside of which it acquires chlorophyll and stomata; it is the pileola.

“The leaf of origin of the flower branch, or, as it is generally called, the flowering glume* (‘glumelle inférieure de la fleur’), is composed in its turn of three distinct parts, of which the recent paper of M. Duval-Jouve† has elucidated the structure, mode of development, and morphological value. The part of the organ below the point of insertion of the awn has three nerves, and corresponds to the sheath of the vegetative leaf; the awn, which receives the median bundle of the sheath, answers to the blade of the vegetative leaf; lastly, the portion of the organ above the point of attachment of the awn, often bifid, always deprived of a median nerve, but in which the two lateral nerves of the sheath are prolonged, is the ligule, more developed than that of the vegetative leaf, but similar in its structure to that of *Psamma arenaria*. Of these three constituent parts, the relative development of which is very unequal in different plants, the two last, the awn and the ligule, appear at the same time; the region below the insertion of the awn is formed more tardily, and in certain plants elongates but very little or not at all, so that the awn and the upper region of the flowering glume remain sessile. In this last case the identity of composition between the cotyledonary leaf and the flowering glume is complete. The scutellum of the one corresponds to the awn of the other, and the pileola of the former, with a still greater development, to the bi-nerved ligule of the latter.

“From the vegetative leaf, then, we pass to the flowering glume by a transformation of the blade, a greater development of the ligule, and a lesser elongation of the sheath, and it only requires to take another step in the same direction to reach from the flowering glume to the cotyledon of the embryo. There is a unity of construction.

“It must nevertheless be allowed that the cotyledonary leaf presents in a great number of Grasses a remarkable condition of which I know no example in the other leaves of the plants in this family. This is the separation of the blade (scutellum) from its bistipular ligule (pileola), brought about by the interposed growth of the stem, or elongation of the cotyledonary node of which the blade occupies the lower and the ligule the upper boundary.”

Remarks follow upon the mode of origination of the embryo in relation to the mother plant, considered on the view of its being an axillary production of the flowering glume. The author then considers the cotyledon in *Cyperaceæ*, and then in some other Monocotyledons. He concludes:—“The Grasses and *Cyperaceæ* are distinguished

* The “lower pale” of many English botanists, who adopt R. Brown’s interpretation of the flowers of Grasses.—[Ed. Journ. Bot.]

† *Etude Anatomique de l’Arête des Graminées* (Mém. de l’Acad. des Sciences et Lettres de Montpellier, 1871). M. Duval-Jouve in this memoir further distinguishes in the awn of Grasses when complete two parts—a lower twisted portion, the *column*, often absent, and a terminal part not twisted, the *subule*; corresponding respectively to the petiole and true blade of the complete foliage leaf.—[Ed. Journ. Bot.]

from other Monocotyledons, at least from all those which we have passed in review, by a greater specialisation, a more thorough separation between the limb and the superior sheath. Each of these parts of the cotyledon has in fact its own vascular bundles, which never pass back to another organ, whilst in other Monocotyledons, even when the upper sheath is in its most highly developed state and provided with bundles, these always return to the limb. It is, however, not the less true that there exists a complete transition series between the two extreme states presented by the cotyledons of Monocotyledons, viz., that in which the superior sheath does not exist, as in the onion and lily, and that where this upper sheath acquires, in relation to the limb, not only a great predominance, but even a nearly complete independence, as in Grasses and *Cyperaceæ*."—[From the *Annales des Sc. Naturelles*, ser. 5, tom. xv. (1872), pp. 236—276.]

CLAVIS EMENDATA MARSILEARUM ET PILULARIARUM.

AUCTORE A. BRAUN.

Abbreviationes.—Spcp.=Sporocarpium (receptaculum, Auct.). Cpd.=Carpodium (vulgo stipes). F.=folium, foliolum.

MARSILEA.—Sori in sporocarpio zygomorpho transversales, pinatim dispositi. Folia lamina quadrifoliata instructa.

A. Spcpii nervi laterales prope bifurcationem anastomosantes (Monatsb. 1870, s. 703, f. 5—7).

a. Spcp. raphe et dentibus carens.

α. Spcpia numerosa (6—25) supra basin petioli seriatim disposita, cpdiis brevioribus cernuis insidentia.

† Spcp. subglobosum angulis carens. Sori utrinque 3.

* Spcp. 10—25, serie alte supra basin petioli incipiente disposita.

1. *M. polycarpa*, H. et G. (Amer. austral. et centr., Cub., Ins. Societ.)

* * Spcp. 8—12, serie prope basin petioli incipiente.

Var. *mexicana*, A.Br. (Mexico).

† † Spcp. obovatum obtuse pentagonum. Sori utrinque 5.—

Spcp. 6—10, serie prope basin p. incipiente.

2. *M. subangulata*, A.Br.* (Caracas, Jamaica).

β. Spcp. pauca (2—3) a basi petioli paullo remota, cpdiis deflexis.

Spcp. oblongum pentagonum. Sori 6—8. (Pili spcpii læves.)

3. *M. deflexa*, A.Br. (Brazil, Columb.)

b. Spcp. raphe et dentibus instructum compressum marginatum, in basi petioli solitarium. Cpd. elongatum descendens. (Pili spcpii læves.)

4. *M. subterranea*, A.Br.† (Senegamb.)

B. Spcpii nervi laterales ad marginem ventralem usque distincti. (Monatsb. 1870, s. 702, f. 1—3.)

* Var. *M. polycarpæ* ?

† An hujus sectionis? Conf. Monatsb. 1870, p. 724.

- a. Spcp. plura (2—5) in eodem petiolo, compressa, bidentata.
- a. Cpdia basi plus minusve inter se connata, erecta vel adscendentia.
- † Cpd. a basi petioli remota, ad medium fere connata, spcpio mox depilato duplo longiora. Dentes spcp. subæquales, pili læves.
5. *M. quadrifoliata*, L. (Eur. et As. med., Amer. sept.)
- † † Cpd. subbasilaria, breviter connata, spcpio hirsutissimo triplo-quadruplo longiora. Dens superior brevissimus, pili verrucoso-punctati.
6. *M. Macropus*, Engelm. (Texas).
- † † † Cpd. basilaria. Dentes spcpii vix conspicui.
7. *M. Brownii*, A.Br.* (Australia).
- β. Cpd. distincta vel basi vix cohærentia, erecta vel adscendentia.
- † Cpd. longitudine spcpii vel sesqui- (rarius duplo-) longiora. Spcp. matura citius depilata.
- I. Spcp. sæpissime 3.
1. Spcp. medio costata margine tumida. Cpd. subbasilaria, basi subconnata.
- † Dens superior longior. F. eroso-crenata.
8. *M. erosa*, W. (Ind. or.)
- † † Dentes breviores subæquales. F. integerrima.
- Var. *Zollingeri*, A.Br. (Java).
2. Spcp. ecostata, haud marginata.
- † Cpdia distantia. F. crenata vel subcrenata.
- * Dens superior paullo longior.
9. *M. diffusa*, Lepr. (Canar., Alger., Seneg., Afric. cent.)
- * * Dens sup. duplo fere longior.
- Var. *cornuta*, A.Br. (Angola).
- † † Cpd. approximata. F. integerrima.
- Var. *approximata*, A.Br. (Madagascar).
- II. Spcp. sæpissime 2. Cpd. basilaria.
1. Spcp. ecostata haud marginata. F. crenata.
- † Spcp. oblonga, horizontalia.
10. *M. crenulata*, Desv. (Mascar. Philipp.)
- † † Spcp. suborbicularia, subnutantia.
- Var. *incurva*, A.Br. (Senegamb.)
2. Spcp. ecostata, marginata utrinque medio tumida, suborbicularia. F. crenata.
11. *M. brachycarpa*, A.Br. (Pegu).
- † † Cpd. spcpio breviora. Spcp. plerumque bina, basilaria, pilis longis patentibus ad maturitatem usque vestita.
- I. Spcp. leviter costata.
12. *M. brachypus*, A.Br. (Penins. Ind. or.)
- II. Spcp. ecostata.
13. *M. gracilenta*, A.Br.† (Concan.)

* Species non satis cognita, *M. quadrifoliata* similis.

† Varietas præcedentis?

- b.* Specpia ad basin petioli normaliter solitaria (rarius bina).
a. Epidermis specpii persistens (æque ac in præcedentibus).
† F. sclerenchymate carentia (quod item de præcedentibus valet).
I. Specp. dentibus binis subæqualibus.
1. Cpd. specpio brevius. Epidermis foliorum tuberculis carens.
a. Dentes specpii brevissimi obtusi. Cpd. brevissimum cum specpio inæquilatèro lateraliter declinatum.
† Specp. distiche conferta, pilis longioribus patulis.
14. *M. pubescens*, Ten. (Flor. mediterr.)
† † Specp. minus regulariter confertum, pilis brevioribus adpressis.
15. *M. strigosa*, W.* (Rossia mer.)
b. Dentes magis conspicui. Cpd. specpio dimidio circiter brevius erectum.
† Specp. ventre exaratum.
16. *M. exarata*, A.Br. (Austral. or.)
† † Specp. ventre obtuse carinatum.
17. *M. hirsuta*, R.Br. (Austral. septentr. et or.)
2. Cpd. specpio longius. Epidermis foliorum tuberculis ornata.
a. Specp. horizontale parvulum (4—5 mm. longum). Cpd. specpio duplo, rarius triplo longius.
† Specp. ventre non exaratum. Epidermis nonnisi in pagina superiore fol. tuberculosa.
§ F. integerrima, valde pilosa.
18. *M. Howittiana*, A.Br.† (Austral. centr.)
§ § F. crenata, sericeo-pilosa.
19. *M. sericea*, A. Br. (Austral. merid.)
§ § § F. inciso-crenata, parce pilosa.
20. *M. Mülleri*, A.Br. (Austral. merid.)
† † Specp. ventre leviter exaratum. Epidermis in utraque pagina folior. tuberculosa. (F. subintegerrima vel crenulata, inconspicue pilosa.)
21. *M. macra*, A.Br. (Austral.)
b. Specp. oblique adscendens aut omnino erectum magnum (5—10 mm. longum).
† Specp. ventre non exaratum. Epid. nonnisi in pagina superiore fol. tuberculosa.
§ Specp. ovale, leviter inclinatum aut erectum. Cpd. specpio duplo longius.
* F. integerrima, parce pilosa. Pili specpii breves adpressi.
22. *M. oxaloides*, A.Br. (Austral. occ.)
** F. crenata, valde pilosa. Pili specpii elongati patuli.

* Aut subspecies, aut varietas tantum præcedentis.

† No. 18—26 inter se maxime affines, subspecies *M. Drummondii* distant.

23. *M. hirsutissima*, A.Br. (Austral. cent.)
 § § Spcp. ovatum oblique truncatum adscendens.
 Cpd. strictum specio duplo-triplo longius.
 * F. integerrima valde pilosa pilis verrucosis.
24. *M. Nardu*, A.Br. (Austral. or.)
 * * F. crenata pilis lævibus.
25. *M. Drummondii*, A.Br. (Austral. occ.)
 § § § Spcp. ovale (antice rotundatum) valde inclinatum. Cpd. leviter curvatum specio triplo-quadruplo longius. F. margine crenata et undulata.
26. *M. Salvatrix*, Hanst. (Austral. cent.)
 † † Spcp. ventre exaratum. Epid. in utraque pagina fol. tuberculosa. (Spcp. erectum in cpdio longissimo.)
 § F. integerrima.
27. *M. elata*, A.Br. (Austral. centr.)
 § § F. crenata.
 Var. *crenata*, A.Br. (ibidem.)
- II. Specpii dens superior longior aculei instar productus erectus aut uncinatus. (Epid. fol. lævis).
1. Dentes valde approximati, sinu acuto disjuncti. Cpd. specio brevius. (Spcp. pilis longis patulis vestitum. F. lata integerrima.)
 28. *M. villosa*, Kaulf. (Ins. Sandwic.)
2. Dentes sinu obtuso sejuncti.
 a. Cpd. specio brevius aut æquilongum.
 † F. angustissima lineari-subcuneata antice denticulata.
29. *M. tenuifolia*, Engelm. (Texas).
 † † F. late cuneata integerrima.
 § Pili specp. longiores patuli.
30. *M. vestita*, H. et Gr. (Amer. sept. occ.)
 § § Pili breviores adpressi.
31. *M. mucronata*, A.Br.* (Amer. sept.)
- b. Cpd. specio $1\frac{1}{2}$ —2 longius. (Dens superior valde elongatus uncinatus. Pili ut in præcedente.)
 32. *M. uncinata*, A.Br. (Am. sept. calid.)
- III. Specpii dens superior tantum evolutus, inferior plus minusve oblitteratus aut omnino deficiens.
1. Cpd. strictum modice elongatum. Spcp. horizontale aut oblique adscendens. Fol. epid. lævis.
- a. Spcp. obtusum vel subacutum, fronte neque truncatum, neque exaratum.
 † Specpii dens superior brevis obtusus, inferior minus distinctus.
 § Spcp. suborbiculare subhorizontale. Cpd. specio 2—3 longius.
33. *M. rotundata*, A.Br. (Angola).

* No. 29 et 31 *M. mucronata*, quæ medium tenet, subspecierum vice subordinandæ sunt; *M. tenuifolia* paullo magis distat.

§ § Spcp. oblongum oblique adscendens. Cpd. specio duplo longius.

34. *M. macrocarpa*, Presl (Cap. b. sp.)

† † Spcp. dens superior acutius prominens, inferior omnino fere obliterated.

§ Dens sup. brevis conicus.

* Spcp. longius quam latum, margine ventrali obtusangulo adscendente. (Pili spcp. adpressi. F. emarginata vel biloba.)

35. *M. capensis*, A.Br. (Cap. b. sp.)

* * Spcp. perminutum non longius quam latum. (Pili adpressi, F. integerrima.)

36. *M. Burchellii*, A.Br.* (Cap. b.sp.)

§ § Dens superior aculei instar prolongatus. (Pili specii patentes. F. biloba vel dichotome quadriloba.)

37. *M. biloba*, W. (Cap. b. sp.)

b. Spcp. fronte truncatum et longitudinaliter exaratum.

† Spcp. minus compressum, fronte late exaratum, dorso sellæ instar curvatum latere transverse impressum, dente brevissimo rotundato.

38. *M. ægyptiaca*, W. (Afr. bor., Rossia merid.)

† † Spcp. subquadratum, valde compressum, fronte anguste exaratum, dente elongato conico.

39. *M. quadrata*, A.Br. (Borneo).

2. Cpd. a basi declinata arcuatim adscendens valde elongatum. Spcp. inclinatum vel suberectum. Epidermis cellulæ in utraque fol. pagina gibboso-tuberculiferæ.

40. *M. gibba*, A.Br. (Afric. centr.)

IV. Spcp. dens inferior conspicuus (brevis obtusus), superior plus minusve obliterated.

1. Cpd. brevissimum erectum. (Spcp. horizontale, ventre exaratum. Pili specii læves. F. anguste lanceolata.)

41. *M. angustifolia*, R.Br.† (Austral. sept.)

2. Cpd. modice elongatum, decumbens aut descendens.

a. Raphe specii brevissima. Dentis superioris rudimentum satis conspicuum. (Cpd $\frac{3}{4}$ — $1\frac{1}{2}$ specii æquans arcuatum v. flexuosum. Spcp. oblongum tumidum pilorum lanugine densa vestitum. Pili verrucosi.)

42. *M. Ernesti*, A.Br. (Caracas).

b. Raphe paullo longior, dens superior obliterated.

† Cpd. strictum decumbens v. descendens. Spcp. inclinatum v. subhorizontale compressum, pilis adpressis lævibus dense vestitum.

43. *M. Mexicana*, A.Br. (Mexico).

* Subspecies præcedentis videtur.

† Propter dentium indolem in hac sectione enumerata, sed affinitate proxima cum *M. hirsuta* et *exarata* (No. 16 et 17) conjuncta.

- † † Cpd. flexuosum decumbens, speciei $\frac{3}{4}$ —2 æquans, reclinatum, pilis adpressis laxius vestitum.
44 *M. Berteroi*, A.Br. (St. Domingo).
- † † † Cpd. descendens uncinato recurvatum. (F. canescentia subsericea.)
45. *M. ancylipoda*, A.Br.* (Guayaquil).
- V. Spec. raphe et dentibus carens. (Loco dentis superioris macula oblonga.) (Cpd. varie directum, adscendens vel descendens, specio $1\frac{1}{2}$ —2 longius. Spec. oblongum teres, pilis lævibus vestitum.)
46. *M. mutica*, Mett. (Nov. Caledon.)
- † † Folia striis sclerenchymaticis instructa. (Conf. Monatsb. 1870, p. 692) (Cpd. tenue erectum, speciei $2\frac{1}{2}$ —5 æquans. Spec. bidentatum marginatum costatum. Pili adpressi mox evanidi verrucoso-punctulati. F. nuda).
- a. Spec. erectum elongatum. Sori 4—6
47. *M. Coromandeliana*, W. (Ind. or.)
- b. Spec. inclinatum abbreviatum. Sori 3—4.
48. *M. trichopus*, Lepr. (Senegamb.)
- c. Spec. suborbiculare perminutum. Sori 2—3.
49. *M. muscoides*, Lepr.† (Senegamb.)
- β. Epidermis speciei cito depilata sponte solubilis, testam atram nitidum speciei nucleum laxè involventem constituens. (Conf. Monatsb. 1870, p. 709.) (Spec. compressum, raphe elongata, dentibus oblitteratis. Cpd. breve antrosum inclinatum.)
- † Testa conspicue punctata. Spec. horizontale.
50. *M. nubica*, A.Br. (Nubia).
- † † Testa inconspicue punctata. Spec. declinatum.
51. *M. gymnocarpa*, Lepr. (Senegamb.)

PILULARIA.—Sori in sporocarpio globoso longitudinales. Folia petiolaria, lamina carentia.

- A. Sori 2 (hinc spec. biloculare) Cpd. elongatum descendens. Spec. anatropum. Macrosporæ 2 non constrictæ.
P. minuta, Dur. (Flor. mediterr.)
- B. Sori 2—4, sæpe 3. (Spec. bi-tri- vel quadriloculare.) Cpd. breve descendens, raphe brevi cum specio conjunctum. Macrosporæ 30—50 non constrictæ.
P. americana, A.Br. (Amer. sept. et. austr. extratrop.)
- C. Sori constanter 4 (spec. quadriloculare).
- a. Cpd. brevissimum erectum. Raphe nulla. Macrosporæ 50—100 supra medium constrictæ.
P. globulifera, L. (Eur. temper.)
- b. Cpd. elongatum.
† Cpd. adscendens v. descendens. Raphe nulla.
P. Mandoni, A.Br. (Bolivia).

* Species fructu maturo deficiente non satis cognita. Curvatura singularis cpdii forsan transitoria demum in directionem strictam abiens.

† No. 46—48 subspecierum dignitate sub nomine *M. trichopodis* (sensu latiore) conjungendæ.

† † Cpd. descendens, raphe elongata cum specio horizontale conjunctum. Macrosporæ numerosissimæ (ultra 100) non constrictæ.

P. Novæ Hollandiæ, A.Br. (Australia).

[From the "Monatsbericht d. Kön. Preuss. Akad. der Wissensch. z. Berlin," August, 1872, pp. 668—679.]

Botanical News.

ARTICLES IN JOURNALS.

Linnæa (October, 1872).—F. Körnicke, "Monograph of the *Rapateaceæ* (tab. i).—F. W. Klatt, "Contributions to a Knowledge of the *Primulaceæ*."—Ibid., "Plants from Madagascar collected by A. Garnier."—E. Hampe, "Musci novi Australiæ ex herb. Melbournio a Doct. F. v. Mueller missi."—O. Böckeler, "Cyperaceæ of the Royal Berlin Herbarium."

DECEMBER, 1872.

Grevillea.—M. C. Cooke, "British Fungi" (contd.).—M. J. Berkeley, "On Three New Species of *Agaricus* from a Stove" (*A. (Collybia) Dorotheæ*, *A. (Collybia) caldarii*, *A. (Omphalia) Nevillæ*).—M. C. Cooke, "Blights on Tea and Cotton" (*Hendersonia theæcola*, sp. nov., *Torula incarcerationata*, sp. nov.).—"Novara' Diatoms" (contd.) (tab. vi.).

Journ. Linnean Soc., No. 68 (Dec. 4).—M. T. Masters, "On the Development of the Androecium in *Cochliostema*."—J. G. Baker, "Revision of the Genera and Species of *Scilleæ* and *Chlorogaleæ*."

Botanische Zeitung.—F. Hildebrand, "On the Means of Distribution of Fruits of Grasses."—Ibid., "On Modes of Distribution of the Fruits of Plants by Grappling Organs" (tab. xiii.).

Flora.—H. Wawra, "Notes on the Flora of the Hawaii Islands" (contd.) (*Labiataæ*: *Phyllostegia*, three new species; *Stenogyne*, four new species. *Cyrtandriææ*: *Cyrtandra*, six new species).—J. Müller, "Lichenum species et varietates novæ" (contd.).—G. Winter, "Diagnoses and Notes on Rehm's Ascomycetes" (contd.).—W. Nylander, "Observata lichenologica in Pyrenæis orientalibus" (contd.).—F. Arnold, "Lichens of the French Jura."

American Naturalist.—A. Ridgway, "Notes on the Vegetation of the Lower Wabash Valley" (contd.).—E. L. Greene, "The Alpine Flora of Colorado."

Nuovo Giornale Bot. Italiano (10th Dec.).—P. A. Saccardo, "Notes on certain Amyloid Corpuscles (Somatia) existing in the Pollen-fovilla" (tab. iii.A).—P. Savi (the late), "Virescence (phyllody) in *Bellis perennis*" (tab. iii.B).—F. Cazzuola, "Records of the Effects of the Cold of the Winter 1871-72 on certain Plants in the Botanic Garden, Pisa."—T. Carnel, "Notes on certain Botanic

Gardens and Museums" (in Belgium, Holland, Germany, Austria, England, and France in 1872).—D. Hanbury, "On the Manna of Calabria."—E. Hampe, "Musci frondosi in insulis Ceylon and Borneo a Dr. O. Beccari lecti" (Ceylon, 29 sp., 6 new. *Solmsia* gen. nov. (= *Dicranum scariosum*, Wils)—Borneo, 53 sp., 15 new).

Hedwigia.—A. Geheeb, "Bryological Journey (Brotherus') to Lapland."—G. Limpricht, "Supplement to the Bryologia Silesiaca of Milde."

Botaniska Notiser (16th Dec.).—S. O. Lindberg, "Short Notes on rare Scandinavian Mosses" (contd.) (*Cephalozia obtusiloba*, sp. nov. *C. rigida*, sp. nov.).—F. W. C. Areschoug, "On *Rubus Idæus*, its Affinities and Origin."*

New Books.—E. Strasburger, "Ueber Azolla" (seven plates. Jena, 12s.).—E. Boissier, "Flora Orientalis," vol. ii. Calycifloræ (Geneva, £1 5s.).—J. E. Robson, "Botanical Labels for Herbaria" (Hardwicke, 5s.).—F. Schmitz, "Die Bluthen-Entwicklung der Piperaceen" (five plates).—A. S. Oersted, "On Recent Cupuliferæ, chiefly in relation to Fossil Species" (eight plates and map, and has a French resumé at the end).—F. ab Herder, "Plantæ Severzovianæ et Borszcovianæ, fasc iii."

A memorial has been addressed to Mr. Gladstone urging on the Government the importance of maintaining the Kew Herbarium and Library in close connection with the Botanical Garden, and recommending that, for the future, the British Museum Herbarium (to be placed in the new Natural History Museum at South Kensington) shall be such an one as is fitted for students and casual visitors, and that the two herbaria shall be in intimate relation with each other. The memorial is signed by fifty-four botanists and horticulturists, and is printed in full in the "Gardeners' Chronicle" and "Nature." As the editor of this Journal, whilst heartily desiring to see the Kew collections maintained in their present situation, is opposed to the design of depriving London of an herbarium for higher scientific work, and to any subordination of one establishment to the other, he declines to give further publicity to this document.

In the first part of a new quarto publication, "Journal des Museum Godeffroy" (Hamburg), Dr. Chr. Luerssen has published a list of Ferns of the Palaos or Pelew Islands, collected by Capt. Tetens, forty-two in number, and of those brought from Cook's or Hervey Islands by A. Garrett, twenty-five species; none in either list are new to science. In the same periodical is a contribution by O. N. Witt to our knowledge of the Diatomaceæ of the South Seas, in which twelve new species are described and figured.

Prof. E. Morren has published an interesting account of the work

* The author has kindly furnished us with an English translation of this paper, which we intend to print at length.

done in Botany by the Royal Belgian Academy of Sciences, Literature, and the Arts during the first century of its existence, 1772 to 1871, which is, in fact, an outline of the history of Botany in Belgium for that period. The great impulse given to the study of science by the independence of Belgium is evidenced by the great increase in botanical papers after 1830 (the commencement of M. Morren's "Période nationale"). From that date a short abstract or notice of all the more important communications is given, arranged under subjects, whilst a complete bibliography under authors' names is appended.

The Newbury District Field Club has published an elegant first volume of "Transactions," bearing date 1871. The botanical papers are two—Mr. Britten's contributions to a Flora of Berkshire, already noticed in our pages (vol. x., p. 58); and a list of Phanerogams, Ferns, and Mosses in the parish of East Woodhay, by H. Reeks.

In the "Proceedings of the Royal Irish Academy," Mr. A. G. More has published a catalogue of the additions to the Flora of Ireland since the publication in 1866 of the "Cybele Hibernica." This important paper occupies forty pages, so that it would be quite too long to reproduce in our pages, especially as to do so would be to print over again many things which were first published in this Journal; but it is our intention to give copious extracts in an early number.

Mr. J. Ball has given in the Journal of the Alpine Club an account of the Botany of the district of Bormio in the Lombardy Alps, a rich locality producing *Alsine aretioides*, *Primula glutinosa*, *Cardamine gelida*, *Willemetia apargioides*, *Potentilla nivea*, *Dianthus glacialis*, *Sesleria microcephala*, *Crepis pygmæa*, and *Valeriana supina* amongst other rarities. The district is specially interesting from the fact that some eastern and western alpine types meet here, where they appear to find their extreme limits.

Pringsheim's "Jahrbücher für Wissenschaftliche Botanik" for 1872 is occupied by two papers:—Pfeffer's "Researches on Protein-corpuscles and Asparagin," with two plates; and Wiesner's "Observations on certain Colouring Matters," with one plate.

A useful list of the species contained in the published Fasciculi of Dr. Rabenhorst's Hepaticæ and Bryotheca has been recently issued.

We are glad to make it known that Mr. F. J. Hanbury is collecting material for a complete Flora of the county of Kent. No county Flora is more wanted than this, and we are happy to give publicity to his request that all who have any notes or memoranda, however apparently trifling, bearing on Kentish Botany, will send them without delay. In cases of doubt it is very desirable that a specimen should accompany the record. Mr. Hanbury will be glad to forward to any resident in the county who is willing to work up the flora in his district a copy of the "London Catalogue," in which to mark off the plants which occur. Address:—F. J. Hanbury, Stoke Newington, N.

The Council of the Royal Society have resolved to continue

the "Catalogue of Scientific Papers," carrying on the list up to 1873.

The following are among the appropriations of the Government grant of £1000 for the advancement of science to the Royal Society for 1872:—£50 to T. R. Fraser for investigation of the antagonism between *Physostigma* and *Atropia*; £20 to W. C. Williamson for researches on organisation of fossil plants of the coal measures; £50 to C. R. A. Wright for history of opium alkaloids.

Dr. C. C. Parry has been continuing his explorations in the Rocky Mountains during 1872, and has made large collections.

Mr. A. W. Bennett, M.A., &c., has been appointed Lecturer on Botany to St. Thomas's Hospital Medical School.

Dr. G. Henderson, the Yarkand traveller, is acting for Dr. King as director of the Calcutta Botanic Garden, during the latter's absence in Europe.

Prof. Willkomm of Dorpat has gone for scientific purposes to the Balearic Islands and the South of Spain, and will remain there till August.

As an appendix to the last published part of the "Revue Bibliographique" of the Soc. Bot. de France (Jan.—April, 1872) are obituary notices of the late A. Gris and S. R. Lenormand.

The great European Moss herbarium of Milde has been acquired by the Academy of Nat. Science at Stockholm, and the herbarium of exotic Ferns, &c., has been bought by Herr A. Metzler of Frankfurt-a-M.

HERBARIUM FOR SALE.—Mr. Kuessner, Councillor of the Upper Tribunal at Berlin, died 5th September, 1872, and left a well-kept herbarium arranged according to the system of De Candolle. The herbarium contains 1570 species of plants, chiefly of the north-east part of Germany, principally from the botanically little known province of Posen (Bromberg), a few only of the South of Germany (Reichenhall), and of Switzerland. Most of the plants were collected by Mr. Kuessner himself, and are preserved in twenty-eight fascicles. Offers not under 6s. the century received by Dr. Robert Caspary, Prof. Bot., Königsberg, Prussia.

With reference to a paragraph about Hooker and Baker's "Synopsis Filicum" in our last number, we are requested by the publisher to state that the stock of that work is not yet quite exhausted.

We have been asked by the solicitors to the Portuguese Government to request our readers to reserve their judgment on the conduct of that Government reflected upon in the memoir of Dr. Welwitsch (bottom of p. 9) until a judicial investigation of and decision upon the whole matter—which they say will shortly be the subject of proceedings before the tribunals of this country—shall have been made.

The herbarium of Wimmer, author of "*Salices Europææ*," has become the property of Herr R. Fritze, of Rybnick, Silesia.

Original Articles.

NEW HYMENOMYCETOUS FUNGI FROM STOVES.

BY WORTHINGTON G. SMITH, F.L.S.

(TAB. 129, 130.)

THE conditions necessary for a fine crop of Fungi and an equally good display of flowering plants in a stove are diametrically opposed. Horticulturists know this better than anyone else; therefore Fungi generally have a poor time of it in such localities. A good nurseryman or gardener considers it his first duty to utterly destroy all Fungi the instant he sees them; therefore, though doubtless many foreign species of interest appear on imported exotic stems and native earth, yet so eagerly are they searched for and so ruthlessly are they destroyed by gardeners, that these Fungi seldom meet the eyes of botanists able to determine their characters.

Repeated visits, however, to the London nurseries at Chelsea and elsewhere have enabled me to detect many interesting species of Fungi in the stoves and cool houses. One of these, a *Lepiota* (*Agaricus Georginæ*), which instantly turns blood-red on being touched, I have already described in these pages (vol. ix., p. 1). The majority of the tender species, however, appear to be at present undescribed, though occasionally we get well-known plants, such as *Agaricus acutesquamosus*, Wm., which, though uncommon in this country, is a perfect pest in some greenhouses; and as for *A. cepæstipes*, Sow., a rare plant in Britain, it is *everywhere* in greenhouses and stoves—no amount of supervision can possibly keep it down. *Grandinia granulosa*, Fr., is common on stems, and I have frequently met with *Merulius Corium*, Fr. Several species of *Flammula*, as *A. pierreus*, Fr., and *A. filiceus*, Cooke, now and then appear, with such woody species as *Polyporus lucidus*, Fr. At rarer intervals one meets with *A. volvaceus*, Bull., *Merulius himantoides*, Fr., and *Pistillaria furcata*, Sm. Out of a large number of exotic species I select the following for illustration and description:—

1. AGARICUS (PLEUROTUS) GADINIOIDES, nov. sp.—Whole plant white; pileus rather fleshy, tender, dimidiate, clothed with fine adpressed flocci, hygrophanous, with no gelatinous upper stratum; stem minute, lateral, or none; gills somewhat crowded, and slightly branched; spores white, $\cdot 00027'' \times \cdot 0001''$. Allied to *A. mitis*, P.

On Tree-Fern stems, Veitch's Nursery, Chelsea, 7th May, 1872.

TAB. 129.—Fig 1. *Agaricus (Pleurotus) gadinioides*. Fig. 2. Under surface of ditto. Fig. 3. Section of ditto. Fig. 4. Spores enlarged 700 diameters.

2. AGARICUS (NAUCORIA) ECHINOSPORUS, nov. sp.—Pileus at first slightly furfuraceous, moist, greasy, hygrophanous, citrine, margined with dull green becoming pale, margin slightly striate; stem reddish brown, stuffed or obscurely fistulose, gristly, externally clothed with white scales; gills citron yellow, rather distant; spores red, echinulate, $\cdot 0003'' \times \cdot 00025''$.

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Bull's Orchid House, Chelsea, temperature 75° to 80°, 20th August, 1863.

A striking and most distinct species, nearly allied to *A. Cucumis*, P., and *A. furfuraceus*, P. The echinulate red spores are most uncommon amongst the *Dermini*, but I have observed similar spores in *A. flocculentus*, Poll.

TAB. 129.—Fig. 5, 6, 7. *Agaricus (Naucoria) echinosporus*. Fig. 8. Section of ditto. Fig. 9. Spores enlarged 700 diameters.

3. *MARASMIUS SUBULATUS*, nov. sp.—Pileus moist, at first buff, becoming striate at margin; gills rather thick, ventricose, somewhat branched or connected by veins, faintly stained, at first adnate, rather thick, distant, or very distant; stem horny, subulate, elastic, white at apex, deep brown at base from the first, tapering downwards and minutely pulverulent throughout; odour strong, like *M. Oreades*, Fr.; spores $\cdot 0003'' \times \cdot 0001''$. Allied to *M. rotula*, Fr., and *M. androsaceus*, Fr.

Growing in dense patches on Tree-Fern stems, Veitch's Nursery, Chelsea, 9th May, 1870.

TAB. 129.—Fig. 10, 11, 12, 13. *Marasmius subulatus*. Fig. 14. Section of ditto. Fig. 15. Spores enlarged 700 diameters.

4. *MARASMIUS ARATUS*, nov. sp.—Pileus rich brown, smooth, rugose; stem stuffed, densely but minutely pruinose in every part; gills brown, rather thick, sometimes forming an obsolete collar round top of stem as in *M. rotula*, Fr.; odour strong, fungoid; spores smaller than last, $\cdot 00027'' \times \cdot 0001''$. Allied to *M. fusco-purpureus*, Fr.

Tree-Fern stems, Veitch's Nursery, Chelsea, 10th May, 1872.

TAB. 129.—Fig. 16, 17, 18, *Marasmius aratus*. Fig. 19. Section of ditto. Fig. 20. Spores $\times 700$ diameters.

POLYPORUS XANTHOPUS, Fr.—Pileus very thin, like paper, infundibuliform, sub-oblique, zoned, yellowish brown; stem short, very smooth, shining yellow, enlarged at apex and base; pores decurrent, very minute, round, pallid. On old wood, Bull's Nursery, 1872.

TAB. 130.—Fig. 1, 2. *Polyporus xanthopus*, Fr. Fig. 3. Section of ditto Fig 4. Pores enlarged.

5. *RADULUM CYATHEÆ*, nov. sp.—Crustaceous, pallid, ochraceous, tubercles at first rounded, obtuse, floccoso-villose at the apex, then somewhat cylindrical, irregular, scattered, terete, and becoming jagged at the margins; spores somewhat irregular in shape, $\cdot 00025'' \times \cdot 00017''$. Allied to *R. quercinum*, Fr.

Tree-Fern stems, Veitch's Nursery, Chelsea, 19th May, 1870.

TAB. 130.—Fig. 5. *Radulum Cyatheæ*. Fig. 6. Tubercles, &c., enlarged. Fig. 7. Section. Fig. 8. Spores enlarged 700 diameters.

6. *CLAVARIA CERVINA*, nov. sp.—Slender, slightly branched, branchlets obtuse, tan colour, base brown, stuffed; spores ochraceous. Allied to *C. crispula*, Fr.

On and about Tree-Fern stems, Royal Horticultural Society, South Kensington, September, 1869.

TAB. 130.—Fig. 9. *Clavaria crispula*.

7. *PISTILLARIA PURPUREA*, nov. sp.—Ovato-clavate, clubs obtuse

or acute, glabrous, purple; stem stuffed, distinct, sometimes spotted with crimson; mycelium sometimes blood-red; spores small, nearly round, $\cdot 0001$ " long.

A most distinct species; the blood-red mycelium and crimson spots on stem are characteristic.

TAB. 130.—Fig. 10. *Pistillaria purpurea*. Fig. 11. Section of ditto. Fig. 12. Spores enlarged 700 diameters.

[TAB. 130 will be given in the next number.]

THE PECULIARITIES OF PLANT-DISTRIBUTION IN THE LEEDS DISTRICT.

BY F. ARNOLD LEES, F.L.S.

It is thought some detailed account of the more striking facts in connection with the distribution of plants in the suburban districts surrounding our larger provincial towns, more especially as to the comparative abundance or absolute non-occurrence of certain genera or species, when taken in connection with the geological (and some say even the entomological) peculiarities which the tracts present, may lead to something in the way of generalisation, by pointing to the causes for the otherwise inexplicable absence of some widely diffused species.

Such an account in respect to the town of Leeds may be possibly useful to those interested in this question if, whilst sketching such peculiarities as I am acquainted with, the flora be contrasted with that of Manchester, as described in the last volume of this Journal (p. 305). A resident near Leeds until very recently, I have for many years given special attention to the local botany, with a view towards the Flora of the Riding; and I may, therefore, claim with confidence a somewhat thorough familiarity with its salient features at least.

What I have called the Leeds district I shall consider as restricted to the area within a circle having a radius of some seven miles from the heart of the town. Were I to extend this to ten miles, I could fairly claim admission for between 700 and 800 species, the flora of the country to the north and east of Leeds being as much above the average as the Manchester tract would seem to be below it. There are several reasons for this. Fourth in size of provincial towns (population 300,000), Leeds appears to have in some respects an advantage over other large ones, Bristol excepted, in that its population is closely massed, and its outlying districts not over-run so equally on all sides by manufacturing excrescences.

Lying on the north-east edge of the great Yorkshire coalfield, the thickly inhabited suburbs, with their outgrowth of mills and collieries, spread farthest and are chiefly found to the south and south-west. Here, certainly, taking up the southern third of our district circle, a

country lane is a coal-road or a tramway ; and nearly all but the commonest plants are well-nigh wanting in consequence of smoke and shaly clay soil. Yet even here, in close proximity to huge ironworks (Kirkstall), one of the plants most characteristic of the district still survives—*Geranium pratense* growing in stony pasture-land by an inky river, as it formerly grew all along the valley, flourishing ineradicably until actually buried under smoking mounds of slag ! In this most barren district *Convolvulus arvensis* is not, however, uncommon. It seems rather to prefer, I have thought, the broken shelving edges of a flagstone quarry, or the grey shale bank of an old coal-road, so luxuriant is it in such places here and there ; whilst festooning cinders and sand on railway embankments it is very frequent. Irrespective, too, of the district, I find *Papaver Rhæas* and *dubium*, with *Chrysanthemum segetum*, infesting cornfields not uncommonly.

A great contrast to this obtains in other directions. On the north, north-west, and north-east sides of the town, lying away as they do from the manufacturing quarter, pretty lanes with real country hedges of *Acer campestre* and *Cornus sanguinea*, according as the tract be sandstone or limestone, trailed over by *Tamus* and *Solanum Dulcamara*, *Bryonia*, and not unfrequently *Humulus*—country banks glad in places with *Helianthemum vulgare* and *Galium verum*, *Viola hirta*, and *Thymus*, may all be reached easily in an hour's walk.

Another reason which may be given in explanation of the comparatively richer flora, apart from the agricultural districts coming in so closely to the town, is to be found in a greater variation of surface and underlying strata than occurs near Manchester. In the south of our area alone does the coal formation approach the surface ; and though the greater part of the north-west portion is gritstone, the diversity of surface is great, and the usual infertility not very apparent with us. The river valleys are fertile, and moorlands, with a bog at Adel formerly extremely and still considerably rich botanically, lie within four miles' distance of busy streets. The new red sandstone, with its light soil, is unknown ; and though chalk, oolite, and lias are also absent, yet the magnesian limestone crops up within six miles of the town on the east, and at Roundhay may be found much nearer—rich in each place in the commoner xerophilous species, such as *Helianthemum*, *Anthyllis*, *Carlina vulgaris*, *Hypericum hirsutum* and *montanum*, *Atropa Belladonna*, *Picris hieracioides*, *Gentiana Amarella*, *Plantago media*, *Orchis pyramidalis*, *Brachypodium pinnatum*, &c., whilst *Colchicum autumnale* forms a striking feature in the meadows, and *Lithospermum officinale* in the brushwood.

Going more into detail with regard only, in this place, to the presence or absence of the Manchester non-occurrences, an examination of the Leeds flora affords many contrasts and a few agreements. Out of the twenty-five species classed absentees by Mr. Grindon, twenty are found pretty commonly with us, and five are altogether absent.

Those which I claim are as follow :—*Clematis* has gained a firm footing in two or three localities, and though no doubt formerly introduced, has found a congenial soil and climate on the limestone in

such places as old quarries, and will have to be regarded as a denizen. Even on the millstone grit I have known it in one spot for many years spreading and thriving well. *Papaver Rhæas* and *dubium* are both frequent, the former oftenest in cornfields, the latter more sporadic but perhaps more generally distributed. *Papaver Argemone*, from its preference for light sandy soil, is almost unknown with us. The common *Helianthemum* is restricted within our district to the calcareous tracts, but is there common; the same may be said of *Viola hirta*. *Viola odorata* is somewhat rarer, but occurs on warm hedgebanks in several places, not confined to one soil. *Arenaria serpyllifolia* may be found in almost every cultivated field, but by the wayside is not so frequent as in the south. The *Stellariæ* are universally common, even *S. nemorum* is rather frequent, and *Alchemilla arvensis*, *Scleranthus annuus*, &c., by no means scarce. None of the Mallows are very abundant, though all occur both on and off the limestone, *M. rotundifolia* always near farmhouses, *M. moschata* in hedges or on sandy river-banks, and *M. sylvestris* on waste ground. *Acer campestre* is frequent as a small hedgerow tree loving the sandstone, in company with the broom, the wild cherry, and *Viburnum Opulus*; whilst in *Cornus sanguinea* we have a sub-xerophilous shrub common in our magnesian districts, with the privet and *Euonymus europæus* for associates; the latter, however, rarely ripening its fruit. Of the yellow-flowered Umbelliferæ, *Silva* is frequent in connection with *Agrimonia* and both the Pimpinellas; and *Pastinaca* occasional with *Carduus eriophorus* on the limestone. *Conium*, without showing any preference for soil, is still local, though not rare. *Galium verum* is tolerably frequent, though nowhere abundant within our limits; it approaches within two miles of the town on the sandstone. *Convolvulus arvensis* is plentiful on the limestone with *C. sepium*, and without the latter scarcely less common even in the coal districts. Of the Labiates, *Mentha aquatica* and *sativa*, *Thymus*, *Stachys sylvatica*, *palustris*, and *Betonica*, *Nepeta Glechoma* and *Lycopus*, are all of frequent occurrence. Three others, *Ballota*, *Origanum*, and *Calamintha Clinopodium* are confined to the limestone, but common there; and *Nepeta Cataria*, *Calamintha officinalis*, and *Acinos* occur in one or two spots on the same tract. *Lamium album* is not to be called common, still scarcely to be written rare, though I can call to mind far more stations for *L. Galeobdolon*. The cowslip is plentiful, and the primrose abundant on the limestone, though on the sandstone it occurs only sparingly, and then in bushy boggy places mostly. On the limestone hybrids with the cowslip are exceedingly frequent. *Plantago media* follows the magnesian stratum with us almost as closely as *Brachypodium pinnatum*: within the district circle I never saw one without the other close by. *Hordeum murinum* is local; I know of one station only (Knostrop) in which it is plentiful, and this, too, off the limestone. Of the mural ferns, *A. Ruta-muraria* occurs occasionally, but *A. Trichomanes* is scarce. On the magnesian limestone in one district we lose nearly all the ferns we have except *Scolopendrium*, and *A. Trichomanes* loves best the slate walls and the scar limestone.

The remaining five Manchester absentees are likewise unknown about Leeds in a wild state. They include one mural species—*Cotyledon*, occurring nowhere on gritstone walls I think; one hedge-

row shrub—*Viburnum Lantana*, rare even as a planted ornament of our shrubberies; two sand-loving and one damp-loving species—*Cynoglossum officinale*, *Hordeum pratense*, and *Symphytum officinale*. *Symphytum* occurs, indeed, in two localities within three miles of Leeds, but is, I am led to think, not truly wild in either. Near Wakefield and farther south in the Riding it has all the appearance of a true native. I am not surprised at the absence of *Cynoglossum* from Manchester, Birmingham, and Leeds. Except in the vicinity of the sea and its sand, *C. officinale* is, I fancy, not the common plant it is often considered. It is very widely distributed, and sporadically is occasional in most counties, but inland occurs nowhere in the excessive abundance in which I have found it on the sand-hills at Ireleth near Barrow-in-Furness, at Saltfleet in Lincoln, and Southport in Lancashire. *Hordeum pratense*, too, prefers the sandy pastures we find near the sea, but in 1870 I noticed it on the saline drift below Clent in Worcestershire in some plenty.

In coming now to an analysis of the Leeds district flora, without regard to that of other towns, the more remarkable absentees amongst common species claim attention first. In considering these, however, I shall not confine myself to the narrow limit close to the town I have adopted in the case of the occurrences; but my remarks are to be understood as applying to a much wider area, since it is desirable such species only should be dignified by the title of characteristic absentees as are conspicuously wanting over a tract so wide as to include several localities apparently suitable for them. I should lose more than could be gained, and convey a general impression far from the true one, by needlessly restricting myself here to too limited an area, many species being accidental absentees within an inner circle which have nevertheless a claim not only to admission for an outer one, but a claim to be one of the species characteristic of the district as a whole.

Wall plants generally, not only the mural ferns and *Cotyledon* before mentioned, but also many others, such as *Sedum acre*, *Saxifraga viridactylites*, *Draba verna*, and in a lesser degree *Arabis Thaliana*, are either altogether wanting or singularly rare with us, in comparison with their abundance in other districts, for a distance of ten or more miles around Leeds.

Aquatic and palustral plants as a rule are plentiful and well represented. The only commoner damp-loving species I can call to mind as almost or altogether absent are *Bidens cernua*, *Eupatorium cannabinum*, and *Veronica Anagallis*. *Nymphæa alba* is, however, very rare. *Ranunculus sceleratus*, too, in this class seems unaccountably scarce; within a radius of a dozen miles I could only name one locality, and even there it appears to be dying out. Years ago it was much commoner, for I can remember its characteristic head of achenes, noticed and gathered when a small boy, and such things had just begun to have an attraction for me, by a dozen brick-pond plashes and rural ditch-banks where, though still country, not a trace of it now survives.

Amongst the more common inhabitants of dry banks and fields, *Ranunculus hirsutus* and *Trifolium arvense* are noticeable as quite unknown, and *Lepidium campestre* rare. *Cerastium semidecandrum* and *Coronopus Ruellii* I never met with in the West Yorkshire district.

Of the dry sand-loving species, *Erodium cicutarium* and *Geranium columbinum* are absentees, whilst *Spergularia rubra* may be met with very frequently on the millstone grit. *Geranium pusillum* is not uncommon. It would be a very difficult matter to gather the common mugwort within six or seven miles of Leeds, though beyond that distance, alike on sandstone and limestone, it seems almost ubiquitous in the hedgerows. *Solanum nigrum*, *Lamium amplexicaule*, and *Chenopodium rubrum* are the most conspicuous non-occurrences amongst the weeds. From our cornfields *Thlaspi arvense*, *Lycopsis arvensis*, and *Lithospermum arvense* are markedly wanting; and *Ervum tetraspermum* is quite rare. Our rivers and canals with their banks and osier-beds supply plenty of *Nasturtium sylvestre* and *amphibium*, *Sagittaria*, *Lysimachia vulgaris* and *Nummularia*, *Sanguisorba officinalis*, and Tansy; yet scarcely a trace of *Sinapis nigra*, *Sium angustifolium*, and *Glyceria aquatica*.

In conclusion I may, perhaps, be allowed to instance as briefly as possible some few of what I consider the species characteristic of our district; species which will, I apprehend, be absent from the southern and western large towns, and which in a great measure compensate us for the foregoing somewhat long list of non-occurrences.

Of the short list of more striking Manchester plants given by Mr. Grindon, I do not know any that we lack. With us too the stately and soldier-like "foxglove sentinels" guard our gritstone glens and quarries in exceeding abundance. On the limestone tracts *Digitalis* becomes much scarcer. *Campanula latifolia* shakes its splendid bells freely in our hedgerows, replaced in the calcareous district by *Campanula glomerata*, *C. Trachelium* not reaching us at all. *Myosotis sylvatica* is frequent, associated in our woods with *Geum rivale* and *Lysimachia nemorum*. *Lychnis diurna* is mostly abundant, though here and there absent from tracts of woodland apparently suitable for it in every way, yet unaccountably given over to the too frequent Ramsons and groves of *Lamium Galeobdolon*.

Amongst the choicer denizens of our district is *Aquilegia vulgaris*, which, xerophilous as it ordinarily is, occurs with every appearance of being native on the rocky wooded banks of streams, in several places on the millstone grit, as at Adel, three miles north-west of Leeds, in a wood to which an aqueduct known as the "Seven Arches" gives its name. Here the blooms are invariably a pale delicate pink—on the limestone, where it is plentiful, always purple. *Ranunculus auricomus*, sub-xerophilous too, furnishes another anomaly. Common on the limestone, in some woods on the gritstone it flourishes in even greater abundance, in company with *Circea*, *Sanicula*, and *Adoxa*.

Geranium pratense, again, is a characteristic weed in hilly stony pastures, coming down the valleys of Aire and Wharfe, and occurring on the land between, to within a short distance of the town. *Myrrhis odorata*, carried down by the streams, may be found on the low river-banks to a few miles below Leeds, though more abundant above the town, as at Weetwood and other places.

Actæa spicata, too, though only surviving in one spot within the strict limits of the Leeds district, is abundant on the Permian formation in very many places some twelve miles only from the town, preferring the shade of beech woods, along with *Convallaria majalis* and

Helleborus viridis. *Corydalis claviculata* is a common but charming ornament of the bushy thickets and hedge-banks in the moory upland tracts less than four miles away from machinery and smoke, whilst Adel with its bog and artificial lake, at a no greater distance, produces amongst other not very common plants the following species worthy of special record:—*Hypericum Elodes*, *Epilobium roseum*, *Jasione montana*, *Littorella lacustris*, *Scutellaria minor*, *Myosotis repens*, *Limosella aquatica*, and *Polygonum mite*.

On the entomological peculiarities of the district I am scarcely competent to pronounce. It is not considered a good one for butterflies, and but very few of the Sphingidæ occur in any numbers. The absence of certain plants forming the food for certain larvæ accounts for the want of the perfect insects; but I hardly think it will be found that any of the species I have enumerated as absent from the Leeds district are so because of the non-occurrence of insects whose particular mission it is to fertilise them.

ON THE CH'ING MUH HSIANG, OR "GREEN PUTCHUK," OF THE CHINESE.

WITH SOME REMARKS ON THE ANTIDOTAL VIRTUES ASCRIBED TO
ARISTOLOCHIÆ.

BY H. F. HANCE, PH.D., &c.

AMONGST the drugs held in high estimation by the Chinese is one known by the names of *Ch'ing muh hsiang*, or *T'u ch'ing muh hsiang*, i.e., "Green Putchuk," or "Native Green Putchuk,"* derived from

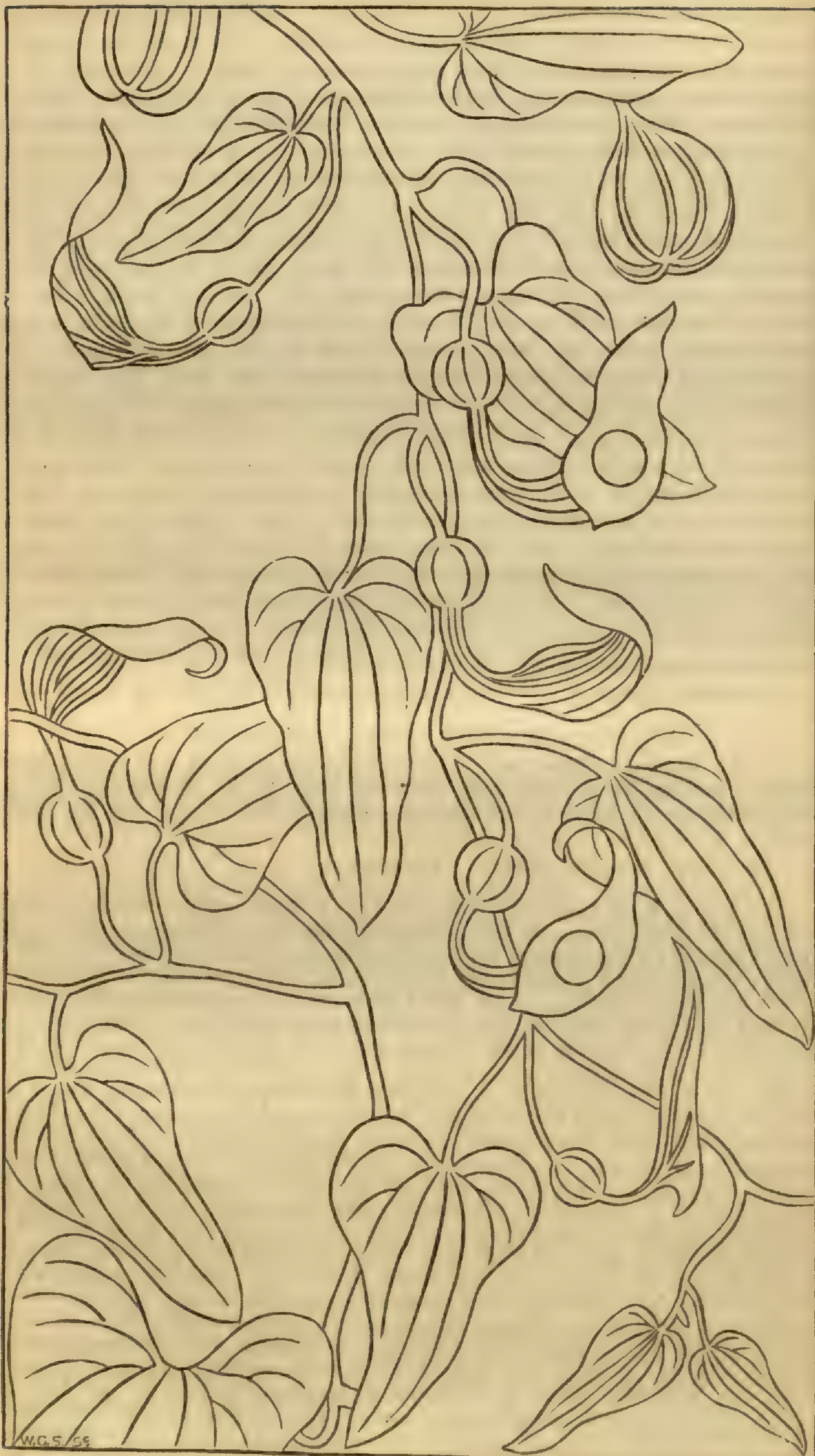
* There appears to be a good deal of obscurity and confusion about the names of this plant; for, with regard to the first, Mr. Bowra states (Rep. on Trade of Ningpo for 1869, p. 66) that a species of *Clematis* and *Rosa Banksia*, R.Br., are both also locally so called, whilst in the *Pên Ts'ao* this same name is said to have originally pertained to the true Indian Putchuk, but to have been subsequently applied to the roots of the *Ma tao ling*. The same authority expressly states that the *T'u ch'ing muh hsiang*, which is a native of Cheang hwai, is of no use as a medicine, so that it apparently draws a distinction between the two. As to the *Ma tao ling* ("Horse-head bells"), Messrs. Hoffmann and Schultes (Noms indig. d'un choix de pl. du Japon et de la Chine, p. 19) have identified this with *Aristolochia Kaempferi*, Willd., and this determination has been accepted by both Mr. Hanbury (Notes on Chin. Mat. med., 20) and Dr. Porter Smith (Contrib. Mat. med. China, 22). But it is at least doubtful. For there is no decisive evidence, I believe, that this species has yet been found in China, though I have a poor specimen which I am inclined to refer to it from Chin kiang; and, moreover, the *Chih Wu Ming Shih T'u Kao*, which explains the name as arising from the fruit resembling the bells or tassels worn on horses' necks, appears (Supplem. cap. 10) to confound this with the *Ch'ing muh hsiang*. Finally, Thunberg says that the plant mistaken by him for *Aristolochia longa*, Linn. (*A. debilis*, Sieb. et Zucc.), is called in Japanese "*Koma no susu*—i.e., 'Campanula equina,' ex similitudine seminum" (Flor. Japon, 144). But Miquel again (Ann. Mus. bot. Lugd.-Bat. ii., 135) assigns the name of *Koma no susu* to *A. Kaempferi*, whilst Tatarinov (Cat. med. sin., p. 38, n. 286) says *Ma tao ling* is the fruit of *A. contorta*, Bunge. I cannot solve these ultra-Sphingean riddles: Davus sum, non Œdipus.

some fancied resemblance to the rhizome of *Aucklandia Costus*, Falc., which latter is largely imported into Southern China, for the purpose of making incense-sticks, &c. It consists of pieces of rhizome of a light brittle texture, varying in thickness from the diameter of the thumb to that of a crow-quill, white internally, and covered with an ash-grey epidermis; and which, when fresh, has a hot camphoraceous peppery odour, and a powerful camphoraceous and bitter taste.* The "Chih Wu Ming Shih T'u K'ao," or "Illustrated Nomenclature and Description of Plants," published only twenty-five years ago, gives a really excellent outline drawing of the plant (here reproduced), and speaks of it in the following terms (cap. 21), for the translation of which I am indebted to Mr. Sampson's kindness:—"The *T'u ch'ing muh hsiang* grows on the slopes of hills in Hu peh province. It is a trailing plant, the small branches, leaves, and fruit like those of *Ma tao ling*; the roots are yellow, small, and fragrant. In medicine it is employed to cure burns and indigestion. It produces flowers in the form of a tube (hollow cylinder, bamboo measure), at first small, afterwards larger, curved like a buffalo's horn, the sharp end being raised, and of a rather deep purple-black hue. The sexual organs are visible within." Dr. Tatarinov was, I believe, the first to refer this product to an *Aristolochia*;† and, subsequently, Dr. Porter Smith, who remarks that "it is a powerful purgative, emetic, and anthelmintic remedy, principally used for snake-bites, being employed both externally and internally," erroneously supposed it to be referable to *A. contorta*, Bunge.‡ Mr. E. C. Bowra, in his Report on the Trade

* Mr. Hanbury (Notes on Chin. Mat. med., 32) speaks of it in a dried state as having a slightly aromatic taste, with but little smell. Rhizomes dried by myself lost their scent almost entirely, but retained their flavour for the most part.

† Catalog. medicam. sinens., p. 12, n. 93.

‡ Contrib. to Mat. med. of China, p. 22. A work which contains a great variety of information on the real therapeutic properties of Chinese drugs, as well as the fancied virtues ascribed to them by native practitioners; but the scientific determinations are frequently very untrustworthy, and generally to be received with the utmost caution. This arises from several causes: from the use of various authorities more or less unreliable; from trusting to Hoffmann and Schultes' determinations of the Chinese names in Japanese books, which my learned friend Dr. Bretschneider (On the Study and Value of Chin. Bot. Works, p. 23) has conclusively shown to be a very fallacious guide—similar names in the two countries often representing only allied species, or even quite different genera; from imperfect practical botanical knowledge, and especially an insufficient critical acquaintance with the Asiatic Flora. When I mention that panduriform leaves are assigned to *Eriobotrya japonica*, that *Elsholtzia* (misspelt *Eschscholtzia*) is referred to *Verbenaceæ*, that *Daphnidium Myrrha* (misspelt *Daphnis Myrrhæ*, the identification professed to be taken from Tatarinov, who writes clearly "*Rad. Daphnidiæ Myrrhæ*") to *Anacardiaceæ*, and that *Fumaria officinalis* and *F. racemosa*, *Bombax Ceiba*, *Rubus Idaeus* and *R. fruticosus*, *Rosa canina*, *Sedum acre*, *Artemisia Abrotanum*, *Matricaria Chamomilla*, *Azalea pontica*, *Lysimachia Nummularia*, *Gentiana asclepiadea*, *Rumex Hydrolapathum*, *R. alpinus*, *Quercus Ilex*, *Agave chinensis*, *Iris florentina*, are all given as Chinese plants, it will be manifest that there is no hypercriticism in these remarks. But I wish to add that they have been written in no unfriendly spirit, but simply because I think it most mischievous to assign distinct sources to medicinal or economical productions without adequate grounds for so doing; and that this mischief is aggravated where, as in the present case, the reputation of the author, as an



of Ningpo for 1868, states that, in the neighbourhood of that port, whence the drug is very largely exported, the plant yielding it is a common garden creeper; and he was so obliging as to procure, at my request, several living plants, one of which has flowered lavishly, and set a single fruit, affording me the opportunity of examining it very satisfactorily. There can be no doubt of its identity with the plant figured in the Chinese work just referred to; and I believe it to be a hitherto undescribed species, of which I subjoin a diagnosis.

ARISTOLOCHIA (DIPLOLOBUS § SESSILES) RECURVILABRA; *sp. nov.*—rhizocarpica, glaberrima, rhizomate horizontali epidermide fusco obtecto ramulos descendentes fibrasque emittente, caule sinistrorsum volubili ramosissimo leviter angulato-sulcato glaucescenti nodis incrassatis pallidis, foliis anguste deltoideo-cordatis obtusis mucronulatis sinu latiusculo truncato auriculas rotundatas divergentes superante supra saturate viridibus infra glaucescentibus crebre tenuiter reticulatis pedatim 7-nerviis nervis albidis 3 mediis subparallelis exterioribus divergentibus omnibus infra prominulis lamina $1\frac{1}{2}$ — $2\frac{1}{2}$ poll. longa e medio sinu in petiolum $\frac{3}{4}$ —1 pollicarem cuneatim attenuata, floribus axillaribus solitariis cernuis inodoris pedunculo tubum perigoniam subæquanti fultis, perigonii ptyxi valvati extus glaberrimi nervis 6 tenuibus longitrorsus percursi luteo-viridis intus pilis pluriseptatis obsiti ore livide purpureo maculisque luteolis picto utriculo 3 lin. diametro globoso supra juxta tubi basin gibbis 2 hemisphæricis notato tubo semicirculariter arcuato sursum parum ampliato 8—9 lin. longo limbi subbilabiati labio inferiore parvulo rotundato subemarginato superiore triangulato-ligulato acuto arcte recurvo 6—7 lin. longo, columnæ depressæ lobis brevibus semiovoideis obtusis dorso medio sulcatis, capsula obovoideo-sphærica apice depressa lineis tenuibus 12 suturalibus haud elevatis alternis (e pedunculo partibili ortis) vix prominulis, seminibus tenuibus compressis concavo-convexis transverse oblongis utraque extremitate emarginatis 2 lin. longis 3 lin. latis margine atro-cinereo ruguloso nucleum paulo pallidiorem triangulari-cordatum cingente. (Exsicc. n. 17612.)

Though some writers would probably describe the flower as one-lipped, the lower lip is evidently developed, being about $1\frac{1}{2}$ line deep: it is quite conspicuous in the unexpanded flower. The upper lip, as soon as the perigone is fully open, becomes abruptly refracted, usually, but not always, with a certain amount of torsion, to right or left indifferently, the apex or side touching the upper part of the tube. But after the pollen is shed, and before the flower falls from the ovary, the lip loses its rigidity, uncurls, and bends upwards into an erect position. The hairs on the lip and in the throat and upper part of the tube are purple; those towards the lower part of the tube, which they completely close, are colourless. All are in structure exactly like those of *A. Goldiana*, Hook. fil., as shown in Mr. Fitch's beautiful plate,* and resemble the filaments of *Conferva*; but as Th.

accomplished physician and student of a foreign materia medica, is likely to lead to his citation as an authority, even in instances where he has committed undoubted errors, and in some cases apparently given mere crude guesses, more or less wide of the truth. A determination which is not perfectly precise is worse than valueless.

* Trans. Linn. Soc. xxv., t. 14.

F. Nees represents those of *A. bætica* as much the same,* I suspect these closely-septate hairs are common to all the species of the genus.

The immediate allies of the Chinese plant just described are to be found in those species which inhabit the region of the Mediterranean basin, and the adjacent territories; and, amongst these it is, I believe, nearest to *A. altissima*, Desf., *A. Pistolochia*, Linn., and especially *A. bætica*, Linn., and *A. parvifolia*, Sibth. et Sm. Amongst East Asiatic species, there are only two with which it is likely to be confounded: *A. debilis*, Sieb. et Zucc.—very imperfectly described by Zuccarini;† at first placed by Duchartre‡ between *A. rotunda*, Linn., and *A. longa*, Linn.; then erroneously located by Klotzsch,§ together with the very different *A. Kaempferi*, Willd., in his section *Podanthemum*; and of which the true position was only recently ascertained by the late Professor Miquel||—and *A. Sinarum*, Lindl. The former is described as having a merely slightly curved and quite smooth perigone, and a capsule and seeds exactly like those of *A. Roxburghiana*, Kl.—that is to say, the former angular, and with conspicuous thick ribs, and the latter differently shaped, and with a pale wing.¶ As to the second, the diagnosis given is so very brief and imperfect that even the section to which it belongs is quite uncertain. It may be the same as my species; but the perigone-limb is described as straight, and the plant is said to be fetid, whereas I find the Ningpo one quite scentless, whether exposed to the direct rays of a bright sun or during or after rain. *A. contorta*, Bunge, of which I possess specimens from the river Sungari, and from the neighbourhood of Peking, differs abundantly, by its leaves much wider in proportion to their length, and smaller only slightly curved flowers, with the lip produced into a long thread-like process.

Undoubtedly no genus comprising a large number of species, widely diffused over both hemispheres, has been so universally credited with alexiteric properties as *Aristolochia*, and this, too, in all ages, and in every condition of society, alike by the wandering savage and the polished citizen or learned physician of a highly civilised commonwealth. In the forcible language of Endlicher,** “Species plurimæ vasorum, imprimis secernentium, nervorum et cutis vitam sollicitantes, in eliminandis e corpore potentiis morbificis, veneno potissimum animali, efficaces, adversus serpentum morsus *unanimi gentium præconio* celebrantur.” As regards those species which are natives of the Mediterranean basin, Theophrastus praises *A. pallida*, Willd., as a remedy for the bites of snakes, when infused in wine and drunk,

* Gen. Plant. Fl. Germ. Dicot. Monochlam., t. 50, fig. 26.

† Abhandl. d. math.-phys. Kl. d. Münch. Akad. iv. Abth. 3., 197.

‡ Ann. sc. nat. Par. 4^e sér. ii., 32.

§ Die Aristolochiaceæ d. Berlin herbar., in Monatsber d. k. Berl. Akad. d. Wissensch., 1859, p. 596.

|| Ann. Mus. bot. Lugd.-Bat. ii., 135.

¶ Miquel loc. laud.; Wight Ic. plant. Ind. or. iii., t. 771; Duchartre in DC. Prod. xv. sect. prior., 490.

** Enchirid. bot., 219. Cfr. on the uses of the species generally—Rosenthal, Synops. plant. diaphor., 246-8; Bocquillon, Manuel d'hist. nat. méd. ii. 919-20.

and used also as a topical application;* and this or other species, probably *A. bætica*, Linn., *A. parvifolia*, Sibth. et Sm., and *A. Pistolochia*, Linn., entered as ingredients into the wonderfully complex *alexipharmaca* of the Greek physicians.† Cicero alludes to the virtues of *Aristolochia* in cases of snake-bites as a universally recognised fact,‡ and Pliny notes the employment of *A. pallida* in such cases.§ The pseudonymous Macer, in his poem “De viribus herbarum,” written during the tenth century, and which for more than five hundred years was the recognised authority on vegetable materia medica, holding in this respect an equal rank to that conceded to the renowned “Regimen Salernitanum”|| in all cases of diet, exercise, and the daily conduct of life, thus refers to *A. rotunda*, Linn:—

“Pestiferos morsus, cum vino sumpta, rotunda
Curat, et assumptis prodest sic hausta venenis.”¶

And this belief was universal during the middle ages. Nor can the dull green foliage, twining habit, lurid tubular flowers, and heavy scent of these plants have led to such a belief,** founded on an attachment to the “doctrine of signatures”; not only because it seems clear that it was inherited from antiquity, but also because, remarkably enough, one of the most curious works devoted to the exposition of this fanciful theory, the “Phytognomonica” of Giambatista Porta—a contemporary of our Gerarde—first published at Naples in 1588, though several times alluding to the presumed virtues of *Aristolochia*,

* Hist. Plant. ix., 13, 3; ix., 20, 4. ed. Wimmer. One hundred and forty years later, Nicander extols the same specific in verse, thus:—

“Τὴν ἥτοι ἔχιος τε καὶ αἰνοπλῆγος ἐχίδνης
ἀγρήτεις ὄφελος περιώσιον. ἔνθεν ἀπορρώξ
δραχμαῖη μίσγοιτο ποτῶ ἐνὶ κερράδος οἴνης.”

—Theriac. 517—19.

+ E.c. Andromachi Theriaca Tranquillitatis, 160; Servilii Damocratis Theriaca, 148; Ejusdem ad venenosorum morsus Antidotus, 11; Ejusdem Antidot. alt. (qua utuntur Psylli), 10. As to the opinions of modern writers on the determination of the species, cfr. Sprengel, Hist. rei herb. i. passim; Billerbeck, Fl. class 225; Fraas, Synops. fl. class 267.

† De Divinatione i., 10.

§ Nat. Hist. xxv., 8.

|| A very pretty little edition of this (and which would have been still more interesting had it been illustrated by parallel references to the writings of mediæval physicians), with a remarkably well-executed translation into English verse, has been recently published by Professor Ordronaux, of Columbia College, New York.

¶ De viribus herb., vers. 1402-3. I quote from the excellent edition of Choulant (Lips. 1832), who well defends the utility and interest of the book, as affording an insight into mediæval life and thought. Sprengel (Hist. rei herb. i., 225) speaks of the author most contemptuously, as “miserrimus monachus.”

** Dr. Alexander Prior, however, asserts (Popular Names of Brit. Pl., ed. 2, p. 22) that the fancied virtues of *Aristolochia Clematidis*, Linn., in assisting difficult parturition were ascribed to it ob formam oris perigonii adhuc expansi feminali haud absimilem; and it is noteworthy that the Jamaica negroes have given a coarse popular name to *A. grandiflora*, Sw., from a similar resemblance.

never once attributes to them antidotal power.* The Arabs are reported to use the leaves of *A. sempervirens*, Linn., when bitten by poisonous snakes,† and *A. indica*, Linn., is similarly employed in India.‡ The early settlers on the Atlantic sea-board of North America found *A. serpentaria*, Linn., held in high esteem by the Indians as a remedy for wounds inflicted by the rattle-snake and other venomous reptiles,§ a reputation perpetuated both by the trivial name and the popular designation "Snake-root." A very large number of species enjoy an equal fame in the Caribbean Islands, and throughout the entire South American continent, amongst which may be mentioned *A. trilobata*, Linn., *A. pandurata*, Linn. (the "Raiz de Mato" of the Venezuelans), *A. odoratissima*, Linn., *A. cordiflora*, Mutis, *A. anguicida*, Linn., *A. fragrantissima*, Ruiz (the celebrated "Bejuco de la Estrella" of the Peruvians),|| *A. macroura*, Gomez, *A. cymbifera*, Mart. et Zucc., *A. ringens*, Vahl., *A. galeata*, Mart. et Zucc., &c. Dr. Weddell was assured by the Bolivians in the province of Yungas that the crushed leaves of the "Vejuco," *A. brasiliensis*, Mart. et Zucc., used topically, are an infallible cure for snake-bites,¶ and Señor Triaña, the accomplished investigator of the flora of New Granada, found *A. tenera*, Pohl in daily use in similar cases, as a never-failing remedy, under the name of "Matos."

Modern physicians seem with one accord to regard these plants as diaphoretics, stimulant tonics, and emmenagogues only; but the array of testimony from all quarters of the globe, and extending over a period of more than two thousand years, in favour of their alexiteric properties, is so overwhelming, that it is in my judgment incredible that these virtues should be imaginary. In the words of Cicero, "Utilitate et ars est et inventor probatus,"** and the subject

* So far as I have been able to discover from a rapid examination of the book—it is not inviting reading—almost the only plants to which Porta attributes the power of curing snake-bites are *Tribulus terrestris*, Linn., *Paliurus aculeatus*, Lam., *Rubus fruticosus*, Linn., *Cirsium eriophorum*, Scop., *Humulus lupulus*, Linn., *Smilax aspera*, Linn., *Arum Dracunculus*, Linn., and *Ophioglossum vulgatum*, Linn. (Ed. Francofurt, 1608, pp. 268, 271, 274.)

† DC. Ess. propr. méd. ed. 2, 259. Forskal is, I believe, the original authority for this statement; but the specific determination is probably erroneous, for *A. sempervirens* has not, to my knowledge, been found in Arabia. Duchartre, indeed, who examined the principal Continental herbaria in the preparation of his monograph, records it only from Crete; but Unger and Kotschy gathered it in Cyprus (Die Insel Cypern, 228), and mention it as a native of Syria, whilst Nyman (Syll. fl. Eur., 330) and Tschihatcheff (Asie min. ii., 455), the latter probably from transcription merely, state it to occur in the Peloponnesus and the islands of the Ægean, and Klotzsch gives Portugal as a habitat (Die Aristol. d. Berl. herb., 595). It is likely, however, that in some of these cases *A. altissima*, Desf., may have been taken for it. Cfr. Duchartre's remark on the frequent confusion of the two in herbaria (DC. Prod. xv. sect. prior, 490).

‡ Royle Illustr. Himal. Bot., 330.

§ Endlicher Enchirid. bot., 219; R. E. Griffith Med. Bot., 532.

|| According to Mr. Ernst (Seem. Journ. Bot. iii., 281), the "Bejuco de Estrella" of Venezuela is an undetermined Menispermacea.

¶ Weddell Voyage dans le nord de la Bolivie, 535.

** De Divinat. i., 7.

seems to me to demand a very careful and dispassionate investigation.

[*Note by Mr. D. Hanbury.*—To the very interesting article of my friend Dr. Hance on *Green Putchuk* may be added a few lines showing how large a trade there is in this drug. Mr. Bowra, in the report referred to by Dr. Hance, estimates the total value of the export trade of Ningpo in 1868 at 6,073,709 taels, or about £2,026,903, of which amount 239,559 taels (£80,274) represent drugs; and of these latter fully *one-third* (or to the value of, say, £26,700) is *Green Putchuk*. The drug, he says, is worth from 10 dols. to 15 dols. per picul, equal to, say, 4d. to 6d. per lb. But the Chinese have several qualities, some of which are far dearer. The supplies are chiefly derived from the plant which is cultivated, but the root of the wild plant is also collected, though to a very small extent.—D. H.]

ON THE ORGANISATION OF EQUISETUMS AND CALAMITES.

BY W. R. McNAB, M.D.

[*Read at the Meeting of the Botanical Society of Edinburgh,
December, 12th, 1872.*]

THE study of the organisation of the older fossil plants is surrounded with so much difficulty and obscurity, that any opinion advanced as to the interpretation of their observed structure ought only to be brought forward after the most careful investigation of the fossils themselves, and also after a critical examination of the structure of their nearest living allies. The imperfect preservation of much of the material the botanist is called on to examine in order to elucidate the nature of these fossil plants, and the impossibility of adopting the only safe method of ascertaining definitely the value of dubious structures by observing their development, enables us easily to understand how so much difference of opinion has existed and does still exist among palæontological botanists. In approaching the subject I do so with much hesitation, and put forward my views merely as thoughts which may be worthy of some little attention by those who are carefully and laboriously working at the subject. These opinions are at variance with those expressed by able investigators such as Prof. W. C. Williamson,* and I come forward only with a sincere desire to help, if possible, in the difficult investigation: to try and elicit the truth, and not to detract from the fine work done by talented and careful observers. My views may also be of further value because I approach the subject from, I venture to believe, a different point of view—namely, that of a botanist who wishes to apply what is known of recent forms to the elucidation of the fossil, because it is to the recent forms I have given most attention. I shall, therefore, make ample use of the figures and descriptions given by Prof.

* Phil. Trans., 1871, p. 477.

Williamson, and shall try and point out that some of his observations will bear a second interpretation; and further, I believe that the Calamites do not differ so much in their essential characters from the living Equisetums as Prof. Williamson thinks. In discussing the subject it will be convenient first to consider the structure of the recent Equisetums, and then examine briefly the fossil forms.

GENERAL CHARACTERS OF EQUISETUMS.*—The Equisetums are vascular Cryptogams, and are more or less intimately associated with the Ferns, Ophioglossaceæ, Rhizocarps, and Lycopods. In all these plants we have the reproductive organs, consisting of antheridia and archegonia, produced by a more or less developed prothallus. By the presence of well-defined vascular tissue in the stems, roots, and leaves, and by the reproductive organs being produced on the prothallus, they are readily separated from the Mosses and Liverworts, while the presence of antheridia and archegonia and absence of seed serve to define them sharply from the Archisperms and Metasperms. The vascular Cryptogams can be readily separated into two groups by the spores. Unfortunately the reproduction is unknown in certain of the forms (*Lycopodium*, *Phylloglossum*, *Psilotum*, *Tmesipteris*), so that the remarks here made do not apply to them. In the Ferns, Equisetums, and Ophioglossaceæ only one kind of spore exists, while in the Rhizocarps and Lycopods (except the four genera just mentioned) two kinds are formed, the macrospores forming a more or less rudimentary prothallus with one or more archegonia, while the microspores form a very minute or imperfect prothallus with an antheridial cell which forms numerous spermatozoids. Leaving out of view the second division, or heterosporous vascular Cryptogams, we take the Ferns, Equisetums, and Ophioglossaceæ, which produce spores of one size only, and in which the prothallus is capable of a lengthened independent existence separate from the spore, a condition not observed in the heterosporous division. In the isosporous division the Ferns are distinguished by the character of the prothallus and the nature of their sporangia. The prothallus is green and produced always on the surface of the ground, bearing both antheridia and archegonia; while the sporangia are always modified hairs arising from a single epidermal cell of the stalked leaves so characteristic of these plants. The Equisetums have a prothallus which, like that of the Fern, is green, and produced above-ground, but differs in being nearly always dioecious,† one small prothallus forming antheridia, a larger one producing the archegonia. The branching of the stem is very peculiar. While in the Ferns the branching of the stem (when it occurs) is always dichotomous, in the Equisetums the branches arise from deeply-seated lateral buds. The leaves are remarkably small and form the peculiar sheaths on the stem. The sporangia are produced on the edges of modified leaves, and grouped together to form the peculiar cone-like terminal fructification. The Ophioglossaceæ must be separated from the Ferns, as they possess very definite characters. In all the known cases the prothallus is not green and is produced under-

* See Sachs' "Lehrbuch" (2 ed.), p. 345, et seq.

† Monoecious prothalli are only exceptional, according to Hofmeister.

ground, bearing both antheridia and archegonia. Branching of the stem is unknown. The leaves are sheathing at the base, the lamina stalked, and the leaf branches, one portion forming the sporangia, which are not modified hairs like the sporangia of the Ferns, but are actually produced in the mesophyll of the leaf. Having thus indicated their systematic position, we may now examine the Equisetums more closely.

The Equisetums produce an underground stem from which erect aerial branches are sent up yearly. The plants inhabit wet places, the stem generally running at a depth of from two to four or even more feet from the surface, and spreading over a space from 10 to 50 feet across.* The underground stem is perennial, varying in diameter from 1 or 2 lines to half-an-inch or more. From the underground stem the erect aerial branches are produced, which in general are only annual, but in some species they remain for more than one year. In *E. giganteum* of South America the aerial stem is about 36 feet high and about an inch in diameter. The largest British species, *E. maximum*, has the sterile branch about 4 or 5 feet in height and about half-an-inch thick. The small branches which are produced in whorls from the stem in some species are very peculiar. Hofmeister has shown that they arise from a single cell in the interior of the tissues at the base of the sheath-leaves, this endogenous formation of branches being peculiar to the Equisetums. These endogenous buds can be readily seen in a young branch of the rhizome of *E. arvense* taken late in autumn or early in spring by making a longitudinal section right through it. When fully formed the buds break through the base of the sheath-leaf, or they may remain for a long time dormant. As many buds should be formed as there are teeth on the sheath-leaves, and in *E. arvense* and other species they form the narrow branches of the plant. The buds formed in the rhizomes may remain dormant till the part becomes exposed to light, when they may rapidly develop. On the underground stems the buds are not produced in complete verticils. Two or three strong ones are formed which may either be developed into new underground stems or form the erect aerial branch.

The roots form in verticils, one immediately underneath each bud, but they are seldom all developed. In structure they resemble much the roots of Ferns, and branch like them in a racemose (monopodial) manner.

The first leaf-bearing branch developed by the embryo produces from 10 to 15 internodes, the sheath-leaves having only three teeth. A new and much stronger branch is soon formed at the base of the first, with four-teethed sheath-leaves. This in its turn produces a new branch, the new branches being always thicker and having more numerous teeth on the sheath-leaves. The stem of the Equisetum consists of a series of generally hollow internodes, with a transverse diaphragm at the base and a sheath-leaf at the upper end. The diaphragms are absent in the cone-like fruit. The base of each internode is surrounded by the sheath-leaf of the internode next below. The outer surface of each internode presents a regular series of ridges

* Sachs' "Lehrbuch" (2 ed.), p. 357.

and furrows which alternate in succeeding internodes, the fibro-vascular bundles being always superposed to the ridges, and thus alternating with the furrows on the surface of the stem. At the node each bundle forks and unites with that of the next internode, thus forming a regular reticulated hollow cylinder in the stem not unlike that in the Ferns. A bundle also runs from each of the teeth of the sheath-leaf and joins that in the internode. Each fibro-vascular bundle contains a lacuna or air canal, which will also be superposed to the ridges, while the lacunæ in the cortical portion of the stem, when present, are superposed to the furrows. The points of the sheath-leaves correspond to the ridges, and a fibro-vascular bundle runs up into each. The buds and roots produced at the base of the sheath-leaves form between the fibro-vascular bundles running to the apices of these leaves.

The cone-like fruit of the *Equisetum* consists of a series of modified leaves. At first there is a modified sheath-leaf, the ring, a bract-like structure beneath the cone. Then come whorls of modified leaves, which, by the peculiar growth of the outer part, form more or less hexagonal shields supported on a narrow stalk. The shield gives rise to from 5 to 10 sporangia, each developed, according to Hofmeister, from a single superficial cell.

This rapid description of the general characters of *Equisetum* will suffice for our purpose, and we shall now direct our attention specially to the minute anatomy of the various parts.

MINUTE ANATOMY OF *EQUISETUM*.—When viewed with a low power the stem exhibits a more or less large central lacuna or air space. Surrounding this are the separate fibro-vascular bundles, arranged in a circle, and separated from the fistular central cavity by a few cells, mostly parenchymatous, the remains of the pith. Each fibro-vascular bundle is supplied with a lacuna towards its inner side. Sometimes there is a well-defined layer of cells, as in *E. sylvaticum*, *E. maximum*, and *E. arvense*, surrounding the ring of fibro-vascular bundles, the sheath of the fibro-vascular bundles, and separating the tissues composing the pith and fibro-vascular bundles sharply from the cortical tissues lying outside. In *E. limosum* and a few others the sheath surrounds each bundle separately. The cortical tissues are in general chiefly parenchymatous, with lacunæ; but in many cases bundles of elongated thick-walled cells occur. These sometimes form a continuous layer, but more generally they are best developed under the epidermis of the ridges on the stem. Outside them is the hard epidermis with stomata, and remarkable for the silica in the walls of the cells.

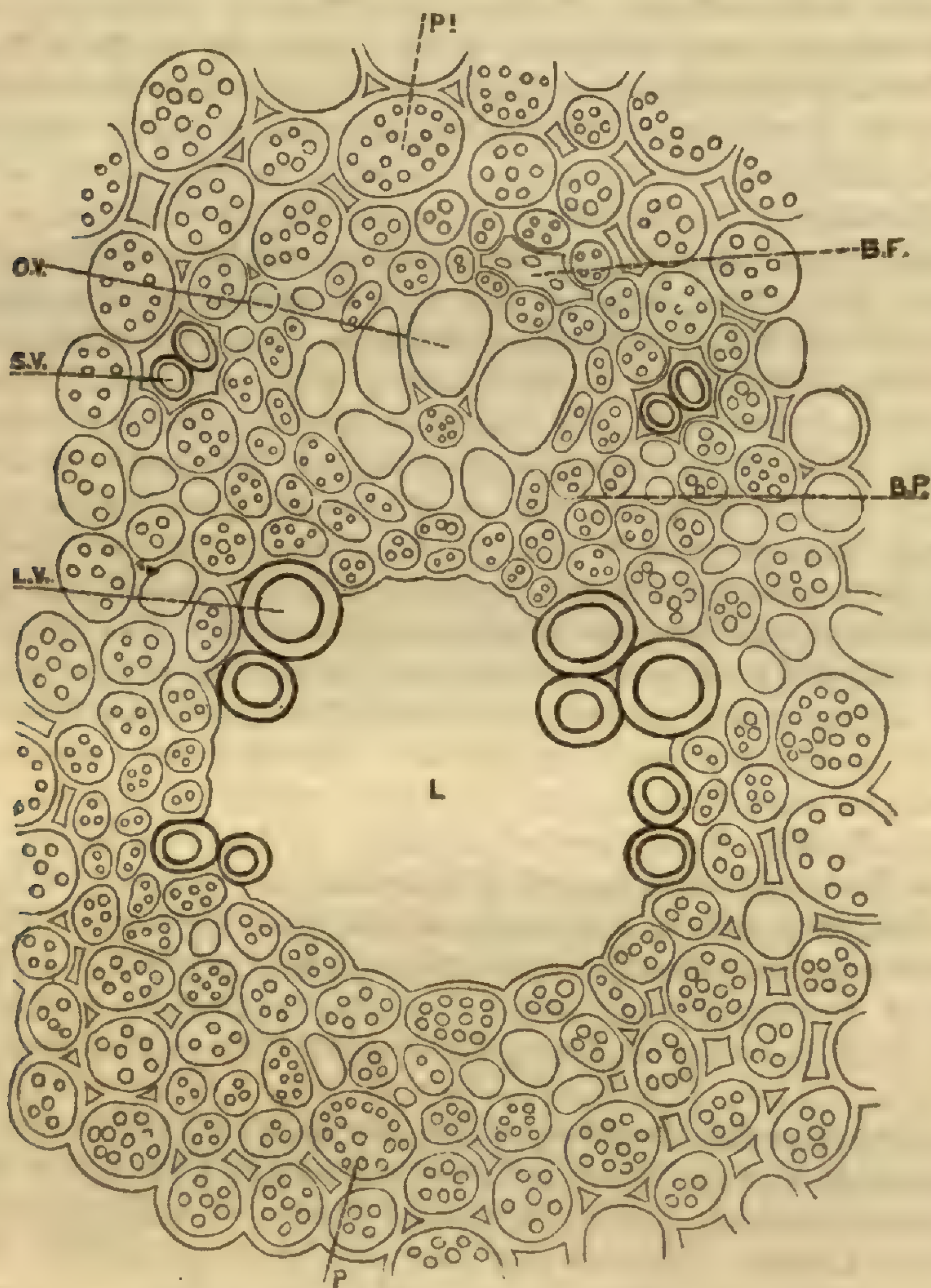
As the fibro-vascular bundles correspond in position to the ridges on the stem, their lacunæ will be in the same radius. The cortical lacunæ, which are often not developed in the smallest aerial branches, alternate with those in the bundles, and are, therefore, in the same radius as the furrows on the outside of the stem. The central lacuna exists both in the aerial stems and in the rhizomes. The use of the lacunæ is evident. The plants grow in wet, frequently stiff and clayey soil which contains very little air; and as oxygen is necessary for the metamorphosis of the assimilated materials stored up in the underground portions of the plant, it readily reaches the reserve materials

through the lacunæ. Plants living in wet places present the well-known peculiarity, in common with water plants in general, of having the ligneous portion of the fibro-vascular bundles only slightly developed. The necessary strength and firmness in the stem and rhizomes are obtained by the development of peculiar, long, fibre-like, thickened cells under the epidermis, in the cortical portion of the stem. These cells (sclerenchyma of Mettenius) form a continuous brown-coloured zone of some thickness in the rhizomes, while in the aerial stems they are colourless and chiefly developed under the ridges.

STEM OF EQUISETUM.—The epidermis consists of a single row of cells, generally much thickened, and containing silica in the walls, the stomata forming in the furrows between the ridges. The outer cortical (hypoderma) layer consists generally of elongated thick-walled cells (sclerenchyma, Mettenius), more or less dark brown in colour in the underground stems and colourless in the aerial ones. Those thickened elongated cells are not found in the fertile stems of *E. arvense* and *E. maximum*. They either occur only at the ridges in large bundles, or form also in many rows under the epidermis of the furrows. The inner cortical layer consists of similar thickened cells or soft-walled parenchyma, and contains large lacunæ with bands of parenchyma between them. The separate fibro-vascular bundles form a ring round the pith, the number of bundles corresponding to the ridges on the stem. The ring of fibro-vascular bundles is often separated from the cortical layers by a single layer of cells running continuously round the stem in a regular circle, the sheath of the fibro-vascular bundles. In other cases each separate fibro-vascular bundle is surrounded by a special sheath of its own. The cells of the sheath are often more or less thickened, and in rhizomes the walls are generally brownish or yellow. When each bundle is surrounded by a separate sheath, then the tissue of the cortical portion passes into that of the pith without a break. In general a series of thickened cells exists on the inner side of the fibro-vascular bundles in the rhizome, the walls of the cells being deeply coloured.

The fibro-vascular bundles of Equisetum form a circle round the central lacuna, and are separated from each other by a layer of large parenchymatous cells, sometimes having thickened walls and coloured yellow or brown. The woody part of the fibro-vascular bundle, or that nearest the pith, is occupied by a large lacuna (see figure), which is produced by the absorption of a series of thin-walled parenchymatous cells, often with single vessels among them. At the margin of the cavity often one or more spiral, annular, or reticulated vessels are to be seen, the rest of the periphery of the lacuna being formed of tolerably regular, narrow, thick-walled parenchymatous cells, which are enclosed by the thick-walled cells round the central lacuna. Two other groups of cells are found at the sides of the bundle towards the periphery. The bast-portion of the bundle is also well developed, between the lacuna and sheath of the fibro-vascular bundle. The woody part (xylem, Naegeli) consists of only two forms of cells. The annular, spiral, or reticulated cells which by fusion form the vessels, and elongated parenchymatous cells containing starch which sometimes form the bounding cells of the lacuna, at other times

lie between the groups of vessels. The bast portion (phloem, Naegeli) of the bundle consists of three series of cells. The greater portion consists of bast-parenchyma of thin-walled narrow cells containing starch. Between these parenchymatous cells, either in small groups or scattered, are cells which are wider and contain either granular contents or air. At the outer side of the bundle a more or less



FIBRO-VASCULAR BUNDLE OF *Equisetum hyemale*. (AFTER DIPPEL.)— $\times 310$ DIAMETERS.—P. Parenchyma, containing starch. L V. Large vessels. S. V. Small vessels. B. P. Bast parenchyma. C. V. Cribriform vessels (Siebröhren. Vasa propria). B. F. Bast fibres. L. Lacuna.

regular series of bast-cells with thick walls and small central cavity is to be found. A longitudinal section shows the phloem portion of the bundle with the bast-parenchyma; the wide cells with granular contents; the cribriform cells, forming a sort of vessel by the partial absorption of the transverse wall, a sieve-like arrangement being thus produced; and lastly, two or three bast-fibres, which lie to the outside of the bundle.

ROOT OF EQUISETUM.—The epidermis consists of thin-walled cells of a brown colour, and produces numerous brown-coloured root-hairs. Under the epidermis, which is often destroyed in old roots, many

rows of thickened dark-brown parenchymatous cells are found, the outer cells being empty, while the inner are filled with starch, and passing into thin-walled, colourless, starch-bearing parenchyma more internally. The fibro-vascular bundle occupies the centre of the root, and consists of one or more spiral vessels, the central one, when several are present, being largest. Surrounding the vessels, soft-walled cells fill up the space. These cells form the phloem part of the bundle, and consist of parenchymatous cells (bast-parenchyma) and cribriform cells. The fibro-vascular bundle is separated from the cortical tissues by the sheath of the fibro-vascular bundles.

STRUCTURE OF CALAMITES.—The resemblance between the vegetative parts of Equisetums and Calamites is no mere superficial one. In the Calamites there existed a large underground stem running for a considerable distance and giving off aerial shoots. Such being the case, it is evident that it is these underground stems which would run the best chance of preservation if a new deposit of sediment formed above the place where they were growing. It is also evident that they would remain nearly *in situ*. If we assume that the branches of the Calamite, like those of our Equisetum, were produced by endogenous (*i.e.*, having a deep-seated origin) buds arising from a single cell in the tissue at the base of the (apparently) undeveloped leaves, then we can easily see how they became detached, the attachment being so slight: not as in Dicotyledons and Monocotyledons by a direct passage of the stem tissues into those of the branch, or by true dichotomy as in Ferns and Lycopods. The erect aerial stems would be more likely to be destroyed, and there seems no evidence to prove that they were of much longer duration than the aerial stems of our present Equisetums. The subterranean stems, on the other hand, were probably like those of the Equisetums of the present day of some duration, and constantly increasing by branching. As in the Equisetums, the underground stems seem only to have produced a few—one or two—strong branches, and not to have formed numerous or verticillate branches as the aerial stems are supposed to have done.

The Calamite stem, both aerial and subterranean, possessed a central lacuna or fistular cavity similar to that in the Equisetums of the present day,* and around this central lacuna the fibro-vascular bundles are placed in a circle resembling those in the stem of a young Dicotyledon. It is to the structure of these fibro-vascular bundles that I wish to direct special attention. Each contains a lacuna at its inner portion, and these serve at once to identify the fibro-vascular bundles and their lacunæ in Equisetums with those in Calamites. These bundles are separated by a little mass of parenchyma, while the bundle is apparently prolonged externally, and forms a wedge-shaped mass, the masses uniting externally and forming a continuous layer exactly like the wood of a one-year old Dicotyledon. In this mass the cells have a more or less radiating linear arrangement, with smaller cells between the larger ones. Here in nearly all known specimens the tissue ends,

* Prof. Williamson states (*op. cit.*, p. 505) that the pith of the present subterranean rhizomes of the Equisetums remains intact, not even becoming fistular.

and the stems are generally assumed to have been decorticated. Comparing the stem of the Calamite with that, say, of *E. maximum*, we find that the external cortical layer with its lacunæ is wanting, the rest of the stem corresponding tolerably exactly.

It is quite unnecessary for me to enter into any details as to the structure of Calamites, as the splendid memoir of Prof. Williamson* leaves little to be desired. But there are three points which seem to me well worthy of attention, viz.:—1. Is it necessary to assume that the fibro-vascular bundles in Calamites are differently constructed from those of all recent vascular Cryptogams? 2. How can we account for the stems of Calamites being so frequently decorticated? and, 3. What part does the sclerenchyma (of Mettenius), which forms so important a constituent of the stem of other vascular Cryptogams, play in the construction of Calamites?

1. Is it necessary to assume that the fibro-vascular bundles in Calamites are differently constructed from those of all recent vascular Cryptogams?

If the description of the fibro-vascular bundles ("woody-wedges") in Calamites given by Prof. Williamson† be assumed to be correct, then we find that their structure is essentially different from that of the corresponding parts in Equisetums. Nay, more, not only do they differ from those of Equisetums, but from those of all our recent vascular Cryptogams. In all recent vascular Cryptogams the bundles are closed and definite, the tissues soon become completely differentiated, and after this occurs no further growth can take place. If then Prof. Williamson's description be correct, the bundles of the Calamites differ as much from those of the Equisetums as the bundles of Dicotyledons do, because, according to him, in Calamites and Dicotyledons circumferential growth takes place; *the bundles not being closed and definite*, but indefinite and capable of regular increase by a cambium layer.

In *E. hyemale* (see figure) the lacuna of the fibro-vascular bundle occupies a very definite position, the bast-parenchyma forming at the external part. In the Calamite‡ the lacuna is also bounded on the outer side by cells which resemble very closely the bast-parenchyma in the Equisetum. The lacuna itself forms in the xylem portion of the bundle, and external to it is the phloem portion. Looking at the figure just alluded to, it is evident that there the lacuna cannot be situated like that of Equisetum, if the wood (xylem) portion of the bundle lies *external* to it; and by asserting that the xylem is external to the lacuna, we immediately come to ask, Where is the rest of the fibro-vascular bundle?—where is the bast-portion? The answer would be, The stem is decorticated. If the stem of the Calamite agrees with that of Equisetum in the position of the lacuna of the fibro-vascular bundle, it will indicate accurately where the xylem or wood-portion of the fibro-vascular bundle ends and the phloem or bast-portion begins. Further, it would point at once to the conclusion

* Phil. Trans., 1871, p. 477.

† Loc. cit., p. 480.

‡ Williamson, op. cit., fig. 14, pl. xxiv.

that these curious elongated cells external to the cells near the lacuna *do not form a component part* of the fibro-vascular bundle. In *E. hyemale* the fibro-vascular bundles have superposed to them a series of these sclerenchyma cells of Mettenius, which seems to me to indicate that the so-called bundle in Calamites as described by Prof. Williamson is the fibro-vascular bundle *plus* the superposed sclerenchyma. As the sclerenchyma frequently forms a continuous zone, especially in rhizomes, such an appearance as that presented in fig. 20* would be produced.

There is a specimen in the collection of microscopical preparations in the Royal College of Science for Ireland which throws much light on the structure of Calamites. It is a transverse section of an Equisetum from South America prepared by Norman. It presents the ordinary appearance of an Equisetum stem, with the bundles and lacuna arranged in the ordinary way; but the sclerenchyma bundles are remarkably developed, and run from the epidermis to the fibro-vascular bundles. The preparation has been put up in Canada balsam, which has rendered the phloem portion of the bundle very indistinct, the delicate tissue being quite unresolvable into its individual cells. The large sclerenchyma band runs from the bundle direct to the epidermis. No sheath of the fibro-vascular bundle exists, and the pith cells internal to the bundles are observed to be slightly sclerenchymatous and dark in colour. This is exactly what we find in Calamites, the only difference being that in this South American Equisetum the sclerenchyma bundles are separated by the lacunæ of the cortex, which are wanting in Calamites.

If we consider that outer portion which Prof. Williamson believes to be part of the fibro-vascular bundles to represent the sclerenchyma of the Equisetum, most of the difficulties brought forward by that observer will disappear. The bundles, like those of vascular Cryptogams, would be closed and of small size, while we should not violate all natural affinity in adopting the idea of circumferential growth occurring in them.

2. How can we account for the stems of Calamites being so frequently decorticated?

If we believe the fibro-vascular bundles to be largely developed, as Prof. Williamson considers them, and no tissue being found externally, we are forced to the conclusion that the bark (using that term in the sense that it is ordinarily and incorrectly applied in Dicotyledons) has been removed. All the tissues outside the woody part of the fibro-vascular bundles—namely, the cambium, bast, and proper cortical layers—must have been stripped off or decayed, or in some way have not been preserved. In the Equisetums we find a well-developed cortical layer both in the stem and root. In *E. sylvaticum* the sheath of the fibro-vascular bundle bounds it internally, the epidermis externally, and between the two numerous cells containing chlorophyll are arranged. In others, as *E. hyemale*, most of the cortical tissue is sclerenchymatous, and in other species the hard elongated sclerenchymatous cells under the epidermis are very conspicuous, especially at the ridge of the stem. If then we consider the peculiar tissue in

* Op. cit., plate xxv.

Calamites which I have described as sclerenchymatous, but apparently forming part of the fibro-vascular bundle, to be sclerenchyma, the necessity for considering the stems decorticated at once disappears, and the stems would thus resemble those of our recent Equisetums. But in certain specimens of Calamites a series of cells has been observed outside, which Williamson has described as forming the cortex. The stem exhibiting this structure I believe to have been a young aerial one, and that the tissue which is external to the sclerenchyma was composed of the green chlorophyll-bearing cells. These would be wanting in the underground stems, hence the decorticated appearance usually ascribed to them.

3. What part does the sclerenchyma, which forms so important a constituent of the stems of other vascular Cryptogams, play in the construction of Calamites?

In Ferns the sclerenchyma is largely developed. In *Pteris aquilina* it forms two well-marked dark-coloured plates between the fibro-vascular bundles, and also forms a thick zone under the epidermis, not complete, but defective along two lateral lines. Other small sclerenchymatous bands are scattered between the bundles. In Tree Ferns the sclerenchyma forms a sheath to the fibro-vascular bundles, as was long ago pointed out by Van Mohl.* In Lycopods this sclerenchyma forms an important part of the stem of certain species. It also exists in the roots of Ferns, and in Equisetums it is largely developed in some species, while in others it is but poorly represented. The sclerenchyma in Ferns is generally incorrectly considered to be part of the fibro-vascular bundles, and is described as such. If Prof. Williamson's interpretation of the Calamite stem be correct, then no sclerenchyma exists, or if it did exist it has been lost with the missing cortex. This supposition, however, can hardly hold good, because the sclerenchyma was as likely to be preserved as any other part, and as it forms a more or less complete investing cylinder in most cases, would be certain to have remained surrounding the fibro-vascular bundles, unless removed by force sufficient to have destroyed the more delicate internal tissues. The conclusion that forces itself on me is that the sclerenchyma has not been distinguished from the fibro-vascular bundles. I further believe that Prof. Williamson's paper affords proof of this mistake. In Ferns and Equisetums a branch of small size passes from the outside of the network of fibro-vascular bundles in the stem, into the leaf or branch of the stem. In fig. 13† Prof. Williamson figures a branch passing through between the vessels of the woody-wedge. This structure is quite inexplicable, unless we believe the so-called vessels either to be part of the sclerenchyma, which must be perforated by the tissues running to a branch or leaf; or that circumferential growth has taken place in the bundle after the branch was formed.

That the sclerenchyma also exists in large quantity in *Lepidodendra* I have no doubt, and I believe it forms the whole of the so-called woody-cylinder in that plant, and in which Prof. Williamson believes he has discovered circumferential growth. The pointed base

* Vermischte Schriften, p. 113.

† Phil. Trans., plate, xxiv.

of the Calamite stem indicates clearly that, like the stem of most vascular Cryptogams, the embryonic parts do not enlarge, a condition quite incompatible with the presence of circumferential growths.

If my view of the sclerenchymatous nature of the chief part of the so-called vascular bundles be correct, then no notice need be taken of Prof. Williamson's medullary rays, primary and secondary. It may, however, be as well to point out that these supposed medullary rays pass to the periphery of the stem through the meshes in the fibro-vascular bundles, and therefore in a constantly interrupted and alternating series, while in Dicotyledons the rays are continuous, and do not alter their position at each node. As to the infranodal canals, I would beg to suggest that they were the spots at which the extremely delicate tissue is formed which gives rise to the endogenously formed buds of Equisetums, and from which the branches and roots originate. In Equisetums the branches and roots arise close together at the upper end of the internode, but in Calamites the roots apparently spring from the lower end.

As the structure of our recent Equisetums is so varied, it seems necessary to be very guarded in describing new genera or species from characters derived from the structure of the stems of Calamites. As to the fruits, too little seems to be known about them; but if Mr. Carruther's figures in Trans. Bot. Soc. Edin., vol. viii., be correct, then the Calamite cone differs from all Equisetums in having alternating verticils of sterile and fertile leaves. The sterile leaves are all regularly superposed, while the fertile leaves, each bearing four sporangia, form an alternating verticil of fewer leaves than the sterile one. Should this character be found to hold, it would be an admirable one by which to separate Calamites and Equisetums. The class Equiseteæ is separable into two orders:—1. Equiseteæ; and 2. Calamiteæ. The Equiseteæ distinguished by having all the leaves of the cone modified and bearing sporangia, while the Calamiteæ have only every alternate verticil bearing sporangia.

I think I have said enough to direct attention to the presence of sclerenchyma in these plants, and also to point out to observers who may take up this most interesting subject that the greatest care must be taken in the identification of the various tissues. Further, I trust that those who have worked at the subject will find that I have not misrepresented them, and have only attempted honestly to expound what I believe to be the truth, while at the same time I do not wish to dogmatise or put forward the slightest claim to infallibility.

GENERAL CONCLUSIONS.

1. That the stem of Equisetum differs but little in construction from that of Calamites.

2. That in both Equisetums and Calamites the fibro-vascular bundles are but poorly developed.

3. That the mass of tissue (woody-wedges of Williamson) forming the most important part of the stem consists of the small fibro-vascular bundles, with the addition of a large quantity of thickened parenchyma and prosenchyma (sclerenchyma, Mettenius).

4. That the sclerenchyma (Mettenius) is part of the cortical tissues, and not a portion of the fibro-vascular bundles.

5. That there is no evidence of any growth having taken place in the fibro-vascular bundles comparable to that observed in Dicotyledons; but that if the stems of *Calamites* increased in diameter it was by additions to the *cortical* tissues, and not to those of the fibro-vascular bundles.

6. That the pointed ends of the Calamite stem (indicating that the embryonic parts did not enlarge) lead to the conclusion that circumferential growth did not take place, but that the stem, when it attained its maximum diameter close to the base, remained cylindrical.

SHORT NOTES AND QUERIES.

GODWINIA GIGAS, Seem.—This wonderful Aroideous plant, brought from Nicaragua by the late Dr. Seemann, and described by him in this Journal, vii. (1869), p. 313 and tab. 96, has flowered in Mr. Bull's nursery at Chelsea, and so we are enabled to confirm the description given by its discoverer. The spathe on December 20th, not quite full-grown, was two feet long and eighteen inches in circumference, of a dark reddish-purple colour, hooded at the top, and supported on a thick peduncle eighteen inches long, which was minutely spiny and of a yellow colour mottled with purple. The small figure in our plate of this remarkable object is very faulty, being done entirely from memory. The drawing of Mr. Bull's specimen, of about quarter the natural size, given in the *Gardener's Chronicle* for the 18th of January, gives a very fair idea of its appearance. The spadix was quite concealed at the date above-mentioned; but on January 20th, when I again had the opportunity of seeing the plant, the upper part of the spathe having become withered had been cut off, and the spadix was exposed. This is small compared with the spathe, a little over five inches long (Dr. Seemann's "nine inches" (*l.c.*, p. 313) may have been an error) and about one broad, entirely covered with the closely-set hermaphrodite flowers. I was not able to dissect one of these, but an examination *in situ* appeared to confirm the characters I had previously made out in Dr. Seemann's wild specimens now in the British Museum.—HENRY TRIMEN.

CULTIVATION OF *LORANTHUS EUROPÆUS*.—Dr. Moore, of Glasnevin, Dublin, in a paper read before the Royal Society (on 20th January), has announced the successful establishment of the parasite *Loranthus europæus* on oaks (*Q. Robur* and *Q. Cerris*) in the Botanic Garden there. The seeds were obtained from Dr. Fenzl, of Vienna (the plant is common in Austria), and after many unsuccessful attempts to get them to germinate, by treating them in the same way as the Mistletoe, which is readily propagated by merely placing the seeds on the bark of a healthy branch, success was obtained in two cases by inserting the seed in the centre of a gently bruised bud on a young shoot of the previous year. This was in January and February, 1870; a few leaves of the *Loranthus* appeared in April, 1871, up to which

time the seeds had remained covered with a substance like transparent glue. Last year, 1872, more leaves were developed, so that there is no doubt that the parasite has taken a firm hold. Though the *Loranthus europæus* has been artificially grown, we believe, in Austria, this is the first time that it has been propagated in this country. Its mode of parasitism appears to be different from that of our *Viscum*, the wood of the parasite not penetrating into that of the supporting stem, but merely spreading out between the inner bark and the newly-formed wood, and probably not producing the sucker-like branches which in the Mistletoe originate from a lateral extension of the wood of the parasite, and bursting through the bark of the support, appear like new individuals.

PINUS BUNGEANA, Zucc.—In a paper on some Northern Chinese plants, published in the 13th vol. of the Journal of the Linnean Society, I described the fruit of this tree, and remarked that, whilst Endlicher gave one native name, Dr. Wells Williams had noted that it is habitually called by another at Peking. In a letter just received from my friend Dr. Bretschneider, physician to the Russian Legation in that capital, he points out an inaccuracy in Dr. Williams's statement, and adds some interesting particulars regarding this remarkable Conifer, which I think worthy of being placed on record. I transcribe his own words:—"Dans vos notes sur les plantes de la Chine septentrionale, vous dites, à propos de *Pinus Bungeana*:—Endlicher gives 'the tree of the nine dragons' as the Chinese name, but the characters attached to Dr. Williams's specimens signify 'white-fruited pine.'—Je me permets de vous expliquer cette différence. *Pinus Bungeana*, connu aux Européens de Péking sous le nom de Pin à écorce blanche, est appelé par les Chinois *pai kwo sung*, ce qui veut dire 'pin enveloppé de blanc.' Dr. Williams a probablement remplacé erronément le second hiéroglyphe par un autre prononcé également *kwo*, mais signifiant fruit. Vous savez que *P. Bungeana* n'a pas de fruits blancs. Le nom *kiu lung sung*, cité par Endlicher et mentionné probablement par Bunge, ne se rapporte qu'à un seul arbre de cette espèce, dans le célèbre temple de Tsié-tai-sze, près de Péking. Il est caractéristique pour *P. Bungeana*, dont vous ne faites pas mention, un fait cependant qui a été déjà signalé par Fortune ("Journey to the capitals of China and Japan," si je ne me trompe), qu'à un ou deux pieds du sol le tronc se divise toujours en plusieurs tiges. L'arbre à Tsié-tai-sze en présente neuf, ce qui lui a valu le nom de *kiu lung sung* (pin des neuf dragons), nom donné par l'empereur Kien-lung, qui, frappé par l'aspect de ce noble arbre séculaire, l'a même célébré pas des vers, qui se trouvent gravés sur une tablette en marbre."—
H. F. HANCE.

ACER NIGRUM WITH STIPULES.—Mr. J. F. Mills sends a branch of a Black Maple in which well-formed foliaceous stipules are developed, their bases adnate to the petiole. The peculiarity is confined to a single tree, and the like has not been seen before in Maples, so far as we know. Mr. Mills should inform us if the peculiarity is reproduced next year.—A. GRAY in *Amer. Nat.*, December, 1872.

THE IODINE TEST FOR FUNGI.—I rather think that Mr. Phillips has fallen into an error in your last number (p. 43) in supposing that little or nothing has been done in testing the hymenium of different species of *Peziza* with iodine. Will you permit me to refer him to the four most recent works in which *Pezizæ* are described in order to convince him that far more has been done than he seems to suspect?—Karsten's "*Monographia Pezizæ Fennicæ*," Nylander's "*Observationes*," Fuckel's "*Symbolæ*," and the third part of Gonnermann and Rabenhorst's "*Mycologia Europæa*." In these works he will discover a large number of species, new and old, with the results of the iodine test incorporated in the descriptions.—M. C. COOKE.

Notices of Books.

A Series of Botanical Labels, for labelling Herbaria, adapted to the names in the London Catalogue of [British] Plants and the Manuals of Prof. Babington and Dr. Hooker; with extra labels for all new species and varieties recorded in the recent volumes of the Journal of Botany and the Exchange Club Reports. By JOHN E. ROBSON. London: R. Hardwicke, 1873. (Pp. 256.)

It may well be a subject for doubt whether there be any practical advantage in the use of printed labels. The compiler of the present series thinks that their employment may have the effect of making collectors more systematic in mounting and arranging their specimens and more careful in their records, as well as stimulate inquiry into the differences of the numerous subspecies and varieties, for which separate tickets are provided; but against these rather problematical anticipations may be set some weighty objections. Of course no advanced botanist ever uses such tickets, so that we may limit ourselves to the consideration of comparative beginners. Such should not be encouraged to think that a uniform method of labelling is a matter of primary importance, and it is this tendency that renders printed labels injurious to them. All collectors should endeavour to make their tickets as full of information as possible: much useful detail which would have been written down at length had the collector not been hampered, is lost when he has only a small space provided into which all must be compressed. The desire for uniformity may also lead to hasty determination: the beginner is anxious to ticket his specimens, and affixes a label with the name of the species he thinks nearest, and the specimen is considered done with. Had he no printed ticket he would write a short description or suggest several names in pencil, and so the specimen would be subsequently returned to for comparison and re-examination. Another drawback to such labels is that they may lead the beginner to neglect collecting more than a single specimen of each species in consequence of having no more than one label, when otherwise he would preserve an instructive series.

Leaving, however, the question of their utility, it is certainly to be regretted that a better model was not followed in this series, or that their author should have been influenced by any previous publication. With the exception of the use of a bolder type and the omission of the Linnæan class and order, these labels differ in no respect from the set published twenty-three years ago by Mr. Pamplin. Each label consists of the scientific name, above which is placed the natural order, occasional synonyms, the English name, and the general habitat. Spaces are left for writing in the special locality, time when and by whom collected. As labels the objection to them is that space is occupied by quite unnecessary printed matter, whilst the room left for filling in the important particulars is, as all who have attempted to use the old labels must have found, far too small. The space for the collector's name is a little over three-quarters of an inch long by one-quarter high. A very unmeaning feature of the old labels has been reproduced in giving definite localities for segregates and introductions. Such plants may be, and most have been, observed in many other places besides those given; but the printing of definite localities is very likely to mislead the beginner into supposing they are only to be found there.

Though, therefore, praise can scarcely be given to this publication as a series of labels, in another aspect it is of some usefulness. The volume forms a comprehensive and generally accurate catalogue of the British Flora, with all the latest discoveries duly entered, and the whole arranged according to the usual sequence followed in this country. No less than 3544 labels are included in the volume, this large number being partly the result of duplicates being given whenever the authorities followed differ as to the natural order, but partly to the large number of casuals and aliens admitted. As a very full list of British species brought up to the end of the year 1872, the book possesses an independent value. It may be added that the whole is very well printed and remarkably free from misprints or errors.

H. T.

Proceedings of Societies.

BOTANICAL SOCIETY OF EDINBURGH.—*November 14th, 1872.* Prof. Wyville Thompson, President, in the chair.—The President delivered an address upon Fermentation and Putrefaction. Mr. John Sim noticed the occurrence of *Bupleurum rotundifolium* as a weed in a cottage garden near Perth. Mr. Sadler exhibited specimens of a species of *Lupinus*, resembling *L. luteus*, which he found growing in a turnip-field near Blackshields, about sixteen miles from Edinburgh, the seeds having probably been introduced with guano. Dr. John Lowe noticed the occurrence of *Cicendia filiformis* in considerable abundance on Roydon Common, near Lynn, Norfolk, where it was

first discovered by Mr. Bray.* Mr. I. B. Balfour exhibited and presented to the University Herbarium specimens of *Gentiana nivalis*, which he had collected this autumn on Mael-an-Tarmachan, a mountain 3400 feet high, midway between Killin and Ben Lawers (see vol. x., p. 338).

December 12th, 1872.—Mr. J. McNab took the chair as President, in the room of Prof. Wyville Thompson. The following communications were read:—"On the Organisation of *Equisetum* and *Calamites*," by W. R. McNab, M.D. (see p. 73). Prof. A. Dickson showed some beautiful sections of *Calamite* stems, of different ages, sent by Prof. Williamson, of Manchester, for exhibition on the occasion. The cross sections showed the great increase in size undergone by the wedge-like masses forming the woody-cylinder; while the radial and tangential sections showed the thin plates of smaller cells ("medullary rays" of Williamson) intercalated between the radiating plates of elongated tubes of which the wedge-like masses are composed. These tubes Prof. Williamson considers as analogous to vessels rather than to wood-cells; while they are viewed by Prof. McNab as corresponding to the sub-epidermal "sclerenchyma" found in many *Equiseta*, or to the sclerenchyma surrounding the vascular bundles in some Ferns—this view, in Prof. McNab's opinion, explaining the so-called decorticated condition of most, if not all *Calamite* stems, the bark of which has, he believes, been mistaken for wood. Prof. Dickson was disposed to agree with Prof. Williamson in considering these woody-wedges as integral portions of the fibro-vascular bundles. "On the Disfiguration of Trees along Roadsides to suit Telegraph Wires," by Mr. McNab, President. "Notice of the Occurrence of *Psamma baltica*, R. et S., in England," by Philip Maclagan, M.D. (see Journ. Bot., vol. x., p. 353). H. C. Baildon presented to the museum leaves of *Ficus lasiophylla* from Singapore, the hairs of which are used as a styptic. W. Evans exhibited and presented specimens of *Tetraplodon mnioides* collected at the source of the Medwyn in July last, also specimens of *Aulacomnion androgynum* from Habbies Howe, Pentland Hills. Dr. John Kirk, Zanzibar, presented to the University Herbarium a collection of dried plants from the highest zone of vegetation in the Kilima-njaro, below the line of perpetual snow that crowns the summit. The Kilima-njaro is about 20,000 feet high, in the country of Jagga, East Africa. Dr. P. Maclagan noticed the occurrence of *Poa sudetica* near Kelso in a naturalised condition.

Botanical News.

ARTICLES IN JOURNALS.—JANUARY.

Grevillea. — M. J. Berkeley, "Notices of North American Fungi" (contd.).—E. Parfitt, "*Botrydium granulatum*, Desv."—W.

* Additional Province (4) to "Comp. Cyb. Brit." Greatly extending the north east limits of this species in Britain.—[Ed. Journ. Bot.]

Archer, "Notes on the same."—R. Braithwaite, "*Dicranum undulatum*, Ehrh." (Has been found in Yorkshire by Mr. Spruce and Mr. Anderson.)—M. C. Cooke, "British Fungi" (contd.).

Journ. R. Horticultural Soc. (vol. iii., pts. 11 and 12).—J. Anderson-Henry, "On Imperfect Hybridity."—A. Murray, "On Mimetic Analogy."—Ibid., "On Grafting and Budding."—F. Welwitsch (the late), "On the *Loranthaceæ* of Angola."—M. T. Masters, "Second Report of Experiments on the Influence of Various Manures on Different Species of Plants."

Monthly Microscopical Journal.—R. Braithwaite, "On *Sphagnum subsecundum*, Nees" (tabs. 3 and 4).

Quarterly Journ. Microsc. Science.—W. R. McNab, "Notes on Hanstein's Researches on the Development of the Embryo in Monocotyledons and Dicotyledons" (tab. 4).

Botanische Zeitung.—J. Fankhauser, "On the Germination of *Lycopodium*" (tabs. 1 and 2).—E. Fournier, "New Ferns from Nicaragua" (9 new species described*).—A. B. Frank, "On Transverse Geotropism and Heliotropism."—P. Majewsky, "Short Notes on Plant-Tissues."—H. G. Reichenbach, "On the Geographical Distribution of the Plants of Dr. Spruce's American Travels."—L. Celakovsky, "On *Caucalis orientalis*, L."

Flora.—H. de Vries, "Report on the Chief Botanical Publications in Holland in 1871."—H. Wawra, "Notes on the flora of the Hawaii Islands" (contd.) (*Delissea*, 6 new sp.; *Rollandia*, 4 new sp.; *Cyanea humilis*, n.s.).—W. Nylander, "Addenda nova ad Lichenographiam europæam" (17 new species, 3 from Britain).—E. Tangl, "Description of an accurate Drawing Apparatus."

Hedwigia.—Venturi, "On *Orthotrichum*" (contd.).—R. Ruthe, "Remarks on Hybridisation between *Orthotrichum anomalum* and *O. stramineum*."

Oesterr. Bot. Zeitschrift.—Mémorial, with portrait, of J. Juratzka.—J. Pantocsek, "Plantæ novæ anni 1872 Hercegovinam et Montenegro coll." (*Viola Nicolai*, n.s., *Potentilla montenegrina*, n.s., *P. Jankaeana*, n.s.).—A. Kerner, "On the flora of Dalmatia, Croatia, and Hungary."—P. Ascherson, "Remarks on *Achillæa Dumasiana*, Vatke."—A. Val de Lièvre, "Notes on certain Ranunculaceæ of the Flora Tridentina" (contd.).—A. Kerner, "On the Distribution of the Plants of Middle and East Hungary and Siebenbürgen" (contd.).—J. Dedeczek, "Note on Vegetation at Pisek in November, 1872."—H. Wawra, "Sketches of the Voyage of the *Donau* round the World."—R. von Uechtritz, "Notes on Knapp's Pflanzen Galiziens und der Bukowina."

NEW BOOKS.—B. Seemann, "Flora Vitiensis," part x., completing the work (4to, L. Reeve, £1 5s.).—P. Kummer, "Der Führer in Mooskunde" (8vo, 4 plates, 3s.)

The following is the answer of the Treasury, dated January 2nd, 1873, and addressed to the Rev. M. J. Berkeley, to the memorial alluded to in our last number:—"Sir,—The Lords Commissioners of

* Of these, *Amphiblestra simplex* is *Dictyoxiphium panamense*, and *Hypoderris marginata* no doubt *H. Seemannii*, Prentice in *Journ. Bot.* vii. (1869), p. 240.—(J. G. B.)

Her Majesty's Treasury have had before them your letter of the 3rd inst., and the memorial enclosed in it from various gentlemen engaged in the pursuit of Botany or in instruction therein, with respect to the transfer to the branch of the British Museum about to be constructed at South Kensington, of the scientific collections and library now existing at the Royal Gardens at Kew. Their Lordships desire me to request that you will inform the memorialists that Her Majesty's Government have not formed the intention of removing the collection to South Kensington, and that should anything lead them hereafter to entertain the idea, they will take care that ample notice shall be given, and that the judgment of the persons most accomplished in Botany shall be fairly weighed in the first instance.—I am, sir, your obedient servant, WILLIAM LAW."

We are glad to announce that Mr. J. C. Mansel-Pleydell's *Flora of Dorsetshire* is in the press.

Dr. H. C. C. Scheffer has published a third instalment of his "*Observationes Phytographicae*," notes on the plants of the Malayan Archipelago, illustrated with eighteen plates very carefully drawn, in the thirty-second part of the "*Natuurkundig Tijdschrift voor Nederlandsch-Indie*." He describes fourteen new species of various Orders, and pays special attention to the *Menispermaceae*, thirty-one species of which are enumerated as found in these islands, fifteen being figured. The other plates accompanying the memoir are devoted to two species of *Entada*.

Mr. H. C. Watson intends to print a selection from the materials collected in years past to show the distribution of British Plants through the counties, and has issued a circular to English Botanists requesting them to send any facts additional to those recorded in the "*Compendium of the Cybele Britannica*" and its Supplement, so as to render the enumeration as complete as possible. We cordially second his appeal, and congratulate British Botanists on the prospect of so useful a book.

Dr. Hooker, Director of Kew Gardens, has been elected a Member of the Belgian Academy of Sciences.

Dr. Kerner has given up the Chair of Botany of Prague and stays at Innsbrück. He is now working up the hybrids among the alpine species of *Pedicularis*, *Saxifraga*, and *Primula*.

Mr. Nicholas Brown has been appointed second assistant in the Royal Herbarium, Kew; and Mr. G. Nicholson clerk to the Curator of the Gardens.

Dr. Ernst, of Caracas, has been named by the Government of Venezuela to fill the Chair of Botany in the University of Caracas, where Natural History has hitherto never been taught. He is likewise commissioned with the foundation and management of a small botanic garden and the correspondent botanic museum. For the garden he will have the two large yards of the University building, both together 1300 square metres large, which will give about 800 square metres available ground for planting.

We regret to announce the death at Catania, Sicily, on January 5th, of W. Amherst Hayne, Esq., B.A., in his twenty-sixth year. Mr. Hayne contributed an interesting and valuable paper on the Flora of Moab to our volume for last year.

Original Articles.

SUPPLEMENTARY CONTRIBUTIONS TO THE FLORA OF NORTH CORNWALL.

BY J. G. BAKER, F.L.S.

I HAVE been much interested in studying the list of plants gathered by Dr. Hind in North Cornwall, printed at page 36 of the present volume of the Journal. So far as botanical records go he has entered upon almost untrodden ground, for from Turner and Dillwyn down to the recent Devon and Cornwall Flora of Keys and Holmes, there are extremely few stations reported from the tract to which his notes refer. And yet it is a district almost as large as the county of Middlesex in area, and one which I believe, when the flora of the Peninsula comes to be fully worked out, will be found to have a distinct and decided character of its own, though marked by negative, scarcely at all by positive, characteristics. In a sentence, this tract may be described by saying that it is that part of the county of Cornwall to which Cowper's definition—

“Where England, stretched towards the setting sun,
Narrow and long, o'erlooks the western wave,”

does not apply. This is a right-angled triangle added to the north of the “narrow and long” portion of the county at its eastern extremity, with a line twenty miles long from Tintagel east to Launceston for its base, the county boundary running out due north from Launceston along the Tamar for twenty miles towards Hartland Point and Clovelly for its perpendicular, and a magnificent sweep of craggy coast facing the north-west for the hypotenuse. The cliffs rise as we pass along from north-east to south-west, but the country falls rather than rises inland towards the Tamar, and nowhere within the triangle do we reach a height of 1000 feet. This triangle of comparatively low-lying country, populated very thinly, cultivated imperfectly, with wide sweeps of low undulated swells, with little actual heather-land still remaining, and quite destitute of the thick hedgerows, and deep lanes, and wooded brooks with deep sylvan banks which we commonly associate with the idea of Devonshire scenery, is completely bounded on the south by the great granite mass of Dartmoor and the ridge of high bare hill that forms the backbone of Cornwall; and thus shut in on the south and exposed to the sea on the north, with very little variety in station within its area, looks in physical character and botany like a slice out of the poorer part of Cumberland or Lancashire translated to the South of England, and offers a great contrast to the district between Exeter, Torquay, and Plymouth by the total absence of many species of a Southern type which the south of the county yields, and the rarity of many others of a Southern type of character which we are accustomed to see commonly even about London and in the Midland counties. So that I believe Dr. Hind's

list will be found to be a much fuller representation of the total flora than anyone who looks through it with Watson's Compendium or Keys' Flora, without understanding the actual character and peculiarities of the tract, will be likely to suppose. I paid a visit to the district for three days in the autumn of 1871, and made notes on the spot of all the interesting plants I saw, and I find that Dr. Hind has fallen upon them nearly all. Like him I found Bude to be much the most interesting locality from a botanical point of view. Here there is a break in the line of coast crag, with a stream breaking through a sandy beach bordered by low sandhills. Although the cliffs along the coast are carboniferous, there are very few of the characteristically limestone plants. In fact, as I have hinted already, all the three elements likely in this part of the world to bring in rare plants, the Southern tendency, the Montane-sylvan tendency, and the Xerophilous tendency, are either absent or negatived by circumstances, and it is these combined negations that constitute the interest of the district, and make me glad to see such a good basis for its flora now laid.

Running through my notes, I find mention of a few additional species, and offer also a few suggestions with regard to some critical plants already mentioned in Dr. Hind's list:—

Barbarea præcox. Roadsides near Launceston and Yealm Bridge. Doubtless a garden escape.

Polygala depressa. Heaths near the coast south of Bude.

Lepidium Smithii. Near Stratton and Yealm Bridge.

Sagina maritima. Shore at Bude.

Erodium moschatum. Shore at Bude, apparently truly wild.

Ulex Gallii. In several places, in moory pieces of ground. This is no doubt what Dr. Hind intends by *U. nanus*, and is extremely common through the province.

Prunus Cerasus. Plentiful in the lane between Yealm Bridge and Whitestone.

Rosa tomentosa. Lane near Whitestone, not far from the last.

R. obtusifolia. Hedge a little north of Launceston.

Rubi. The frequent forms of fruticose *Rubi* of the district are *cordifolius*, *Radula*, *villicaulis*, *discolor*, and *corylifolius*. I saw also *rudis*, *pyramidalis*, and *Lindleianus* near Launceston, *cæsius* and *altheifolius* near the coast at Bude, *umbrosus* in hedges between Whitestone and Red Post, and *fissus* and *dumetorum* with ascending sepals on a heath north of Yealm Bridge.

Lepigonum. I saw *neglectum* sparingly near the mouth of the stream at Bude, and *rupestre* abundantly with *Crithmum* and *Armeria* on the cliffs to the south, but not *marinum*, which Dr. Hind mentions.

Pastinaca sativa. Near the coast at Bude.

Peplis Portula. Roadside near Whitestone.

Carduus crispus. Roadside near Whitestone.

Hieracium umbellatum I saw by the roadside near Yealm Bridge, and in other places. Probably Dr. Hind's doubtful *corymbosum* is this, as the true plant is quite unlikely to occur, and perhaps also his doubted *boreale*.

Aster Tripolium. Plentiful by the stream at Bude.

Anthemis nobilis. Roadside near Yealm Bridge.

Bidens tripartita. Ditches in two places near Whitestone.

Melampyrum sylvaticum of Dr. Hind's list should surely be *pratense*. I saw the latter, which he does not mention, more than once, and *sylvaticum* is quite unlikely to be found here.

Bartsia viscosa. Roadside near Whitestone.

Veronica Buxbaumii. Cultivated ground at Bude.

Ligustrum vulgare. Looks like a wild plant, in the lane between Red Post and Stratton.

Atriplex hastata. Bude, &c.

Salix ambigua. Heath between Yealm Bridge and Whitestone, with its two parents, *aurita* and *repens*.

Quercus sessiliflora. Whitestone and Bude.

Ulmus stricta. Roadside a little out of Launceston northwards.

Euphorbia portlandica. On the beach at Bude.

Spiranthes autumnalis. High carboniferous cliffs south of Bude.

Iris foetidissima. Ditches between Whitestone and Red Post.

Scirpus glaucus. Salt-water ditches at Bude.

Glyceria maritima. Bude.

Triticum acutum. Bude.

Lolium temulentum. Bude.

Ceterach officinarum. Walls of the bridge at Yealm Bridge.

REMARKS ON SOME PLANTS NAMED IN DR. HIND'S "CONTRIBUTIONS TO THE FLORA OF NORTH CORN- WALL."

BY T. R. ARCHER BRIGGS, F.L.S.

As a student for many years past of the botany of that portion of Cornwall which lies within about twelve miles of Plymouth, it has been a matter of great interest to me to go carefully over the Rev. Dr. Hind's list of North Cornwall plants inserted in the February number (pp. 36-43) of this Journal, and note the species in it which have not been seen by me in the neighbourhood of Plymouth. I purpose now making a few remarks on some of the plants named by Dr. Hind in this interesting communication, and shall as I proceed venture to insert a few queries.

Delphinium Consolida, L. This I have never seen near Plymouth, either as a "casual" in waste spots about gardens or as a cornfield plant. The list is prefaced by the remark, "When no locality is given, the plant is frequent or common," so we must conclude this to have been found in some quantity. It would be interesting, at least to Cornish botanists, to hear under what circumstances, whether as an agrarian weed or on rubbish heaps about gardens. Similar particulars respecting *Papaver somniferum*, L., would also be of value.

Brassica campestris, L. Bude; and *B. Napus*, L., Norcot Mouth. The mention of these names affords me an opportunity for correcting an error into which I fell when writing last year of a *Brassica* form

from potato-fields near Torpoint in Journ. Bot., N.S. vol. i., p. 265, and specimens of which I have since forwarded to the Bot. Ex. Club for distribution. In the article referred to I spoke of it as something different from the truly annual form of Watson's *B. campestris* (appearing in his Supp. Comp. Cyb. Brit., p. 22, as the second entry under No. 114. "*B. campestris*, Eng. Bot. No. 2234. An annual plant in turnip-fields; Archer Briggs!"), but cultivation of it has since shown me that it is identical with this other, and I have now young plants, produced from seed sown a few months ago, with the decidedly grass-green root leaves of it. When I collected the Torpoint examples last summer, but few, and those small, specimens had escaped the labourer's hoe out of the lines of potatoes, and on them alone were all the leaves perfect; but they had run up so quickly into flower that the grass-green rosette was absent, and hence arose my mistake in supposing them to be a new form. On the larger plants the lower leaves had rotted away, partly from earth having been drawn up around their stems as well as about those of the crop. The only forms growing about Plymouth that I now know coming under Syme's *Brassica polymorpha* are this truly annual *Brassica* and the plant given by Watson immediately after it in his Supp. Comp. Cyb. Brit. as "116. *B. campestris*?, or '*Rapa sylvestris*,' a biennial plentiful along the Thames." I suppose the Bude *B. campestris* to be one of these two; but what is the Norcot Mouth *B. Napus*?

Viola odorata, L. Poughill. I have seen this in Cornwall only where the suspicion of its having escaped from cultivation attaches to it, although it is clearly indigenous on some of the limestone beds to the east of Plymouth, only a few miles from the eastern boundary line of the county. It seems important to have particulars respecting this Poughill station, as it is given by Watson as introduced under Cornwall in his Supp. Comp. Cyb. Brit., p. 23.

Rhamnus catharticus, L. Lansells. A very interesting addition to the county list, though I must confess the possibility of Dr. Hind's having inadvertently written "*catharticus*" for *Frangula* occurs to me, from the fact of the latter shrub not being named at all by him, though so common in many parts of Devon and Cornwall.

Epilobium angustifolium, L. Boscastle. Is this α . *macrocarpum*, Steph., or β . *brachycarpum*, Leight.? I have never seen either in any part of Cornwall, though the first occurs as a doubtful native in one spot near Plymouth, and the latter in another, where it is manifestly only an "escape" from an adjoining garden and shrubbery. Watson does not regard *E. angustifolium* as indigenous beyond Somerset and Dorset (vide Supp. Comp. Cyb. Brit., p. 41).

Epilobium virgatum, Fries. Ashton. Is this the *E. obscurum* of Babington's Manual, ed. 6; and the next, from Kilkhampton, Syme's *eu-tetragonum*? In the neighbourhood of Plymouth *E. obscurum* is much more widely distributed than *E. eu-tetragonum*, though this latter is rather local than rare.

Sempervivum tectorum, L. This is only to be seen about Plymouth in spots where it has been planted, and really ought to have no place in our list.

Carum verticillatum, Koch. Week St. Mary. An important addition to the flora of the county. I have reason to believe that further

particulars respecting it as a North Cornwall species will be shortly communicated to the Journal by a botanist of Launceston. I have never seen it anywhere either in Cornwall or Devon.

Pastinaca sativa, L. Near Norcot Mouth. I have found this but very sparingly in Cornwall, and only where there is a probability of its having been derived from gardens; but it is indigenous on limestone to the east of Plymouth, whence it is frequently conveyed in rubble from the quarries to other spots about the town.

Gnaphalium sylvaticum, L. Hitherto unrecorded for Cornwall and very rare in Devon, though I have seen it in two spots near Plymouth. Is not the common *G. uliginosum*, L., a Bude plant?

Arctium majus, Schkuhr. Poughill, &c. Not previously given for the county. In the neighbourhood of Plymouth I have found quite a series of forms ranging from this to *eu-minus*, Syme; but *A. intermedium*, Lange, or *A. pubens*, Bab. Man., ed. 6., and *A. nemorosum*, Lange, are so ill understood by me that I am at a loss as regards arranging the several intermediate examples under these names.

Carduus pratensis, Huds. Week St. Mary; and *C. acaulis*, L. Bude. Both these thistles are new to Cornwall, and I have never seen either near Plymouth.

Verbascum Blattaria, L. Tintagel. I have only seen this as an alien or casual, generally with cream-coloured flowers. *V. virgatum* is much more frequent, and is always to be found in certain localities near Plymouth.

Cladium Mariscus, R. Br. Moorwinstow. In Cornwall I have seen this only at the well-known Kynance station, and all the other previously recorded ones seem like it to lie in the southern portion of the county, so the Moorwinstow one is an important addition to them.

Carex Oeleri, Ehrh. Moorwinstow. All the plants from the neighbourhood of Plymouth that have been so named I believe to have been only *C. lepidocarpa*, Tausch.

Carex fulva, β . *Hornschuchiana*, Hoppe. Moorwinstow. Last summer I found *C. fulva* on Viverdon Down, in the south-east of Cornwall, and have sent specimens thence in my last parcel to the Bot. Ex. Club. Previous to that I had never seen it in this county, nor have I yet found it in Devon.

I can add two plants to Dr. Hind's list that were noticed by me when in the neighbourhood of Bude for a day or two several years ago. They are:—*Erodium moschatum*, Sm. Between Stratton and Bude. *Rosa micrantha*, Sm. Between Dalstone and Marham-Church.

ON CROSS FERTILISATION AS AIDED BY SENSITIVE MOTION IN MUSK AND ACHIMENES.

BY F. E. KITCHENER, F.L.S.

THE sensitive motion of *Mimulus* has been well known, at any rate, since the time of Sprengel, who curiously enough includes this proper motion among those to account for which he says "we are obliged to suppose an internal impulse, a force independent of external

influences."* In this category he places the stigmatic movements of *Mimulus*, *Martynia*, and *Scævola*, and the movements of the stamens in *Parnassia* and other plants. The object of the movements of the stamens in *Parnassia* was already connected in his mind with that of insect agency, and this has since been conclusively established by other botanists.†

I am not aware that a like connection has been noticed between the stigmatic movements of Musk, and the necessity of insect fertilisation. Vaucher remarks that during *the time of fecundation* *M. luteus* and *M. glutinosus* will, as he himself has tried, close at the slightest touch. The sensitiveness will be seen to play a useful part in this fecundation.

I will take the commonest species, *M. moschatus*, as a type. The flowers vary from erect in the bud to horizontal in the full-blown flower, but never hang downwards. Of the four stamens the anterior, lower, and larger pair ripen after the posterior, upper, and shorter pair. Both pairs of anthers are held together by hairs, and the longitudinal slits of the anther open towards the lower lip, and away from the base of the flower. The style is closely pressed against the upper lip of the corolla, and its stigma has two large flat fan-shaped lobes. In a very young bud these lobes are closed. In a hardly-opened bud the lobes are beginning to open, the lower one bending back against the style; at this time it is that the shorter stamens burst, but as they are much shorter than the style the pollen cannot reach the stigma, and its course down the tube is facilitated by the, at that time, slanting position of the flower. In a just-opened flower the stigmas are fully open, parallel, and opposite to the lower lip of the corolla, its viscous surfaces being therefore both downwards; the shorter anthers are nearly empty, and the longer ones only just beginning to split; the pistil is therefore synacmic with the shorter, and almost protogynous with respect to the longer stamens.

In a flower almost beginning to fade the longer stamens are still shedding their pollen, the shorter ones are withered, and the stigma be-pollened and in many cases closed. This closing may, moreover, be experimentally produced by touching the stigmatic surface with a pencil, in which case the stigmas will close in about thirty seconds. In faded flowers, whether from contact or otherwise, the stigmatic surfaces have closed.

From these facts it will appear that self-fertilisation by the shorter stamens is impossible, and that self-fertilisation by the longer stamens is rendered improbable, (1) by their bursting late; (2) by the direction in which the anthers open; (3) by their not reaching as far as the stigmas, and, as being anterior, by being some slight distance from the upper lip; (4) from the probability that the stigmatic surfaces may have been touched and closed before they burst at all.

On the other hand, an insect attracted to the flower for the honey could hardly leave the flower without some pollen on the upper side of his body or on his proboscis. The hairs which hold the anthers together no doubt facilitate this, as they do in *Pedicularis*, by keeping the stamens from separating. The large size of the stigmatic surface

* Sprengel's "Anleitung zur Kenntniss der Gewächse," part i., p. 274.

† See A. W. Bennett's paper in Journ. Linn. Soc., vol. xi., p. 26.

will of course increase the chance that any insect with pollen on its proboscis or back will not fail to leave some grains attached to it as he works his way towards the bottom of the flower.

But what purpose does the sensitiveness serve? To prevent the stigma being fertilised by its own pollen by insect agency. Without this sensitiveness why should not an insect covered with the pollen of the shorter and synacmic stamens leave the pollen on the stigma of the same plant as he backs his way out? Given the sensitiveness, this is impossible, for as the insect passes under the stigma the sensitive motion is excited, and while he is drinking the honey time is allowed for its completion, or if it be not completed in time, the mechanical effect of the backing motion of the insect will be to complete the closing.

A similar use of a quite different movement has been suggested to me by Miss S. S. Dowson, one of my Cambridge corresponding class. The *Achimenes* (Gesneraceæ) has a tubular corolla five-cleft with a swelling just below the top of the throat. There are four perfect stamens, not much differing in length, and the stigma is ultimately two-cleft. In the bud the pistil is much shorter than the stamens, but by the time the bud is just opened it has lengthened out between the stamens, and its tip is adpressed to the upper lip of the corolla. As yet the stigma has its two branches closely folded together. The anthers at this time are all four close beneath the end of the pistil, and open downwards. The filaments then begin to contract, and the anthers, which adhere together, are drawn lower; and finally the filaments twist themselves up to such a degree that the anthers are drawn down to the very base of the tube. The object of this is clearly to get them out of the way of the stigma, for during the process the pistil has arched forwards and downwards, and the two branches of the stigma have opened. They will be seen to form a fork over a slight rising in the middle lip of the corolla, by which entrance to the flower, except exactly under the stigmatic surfaces, is prevented.

PSEUDOCARPS.

By W. R. McNAB, M.D.

I HAVE taken the liberty of using the word pseudocarps, which has not yet been employed in Botany as far as I am aware, to distinguish fruit-like structures from true fruits. Few attempts seem to have been made to define accurately many of the terms at present used in Botany, and this laxity of expression is the source of many difficulties. Such ordinary every-day words as flower, inflorescence, fruit, &c., seem chiefly to be taken as meaning something which everybody knows and not needing any accurate definition. A flower consists of the reproductive organs with the axis bearing them, and is at once distinguished from an inflorescence, which is a system of axes bearing the flowers. In describing fruits it is best to consider the fruits of Archisperms and Metasperms separately. The fruit is the ovary, physiologically changed, arrived at maturity after fertilisation, and containing the ripe seeds. The ovary is part of the gynœcium of

a flower (in epigynous flowers part of the ovary consists of the hollow receptacle); the style and stigma not forming an essential part of the fruit. As the gynœcium may consist of many parts, either separate or combined—that is, may be apocarpous or syncarpous—it follows that when the gynœcium is syncarpous only one fruit can be formed by one flower, while in apocarpous gynœcia there may be one or many fruits produced.

After fertilisation not only does the gynœcium become changed, but other parts become modified which often do not even belong to the flower. When a fruit-like structure is thus produced by changes outside the gynœcium of one flower, a pseudocarp is formed. As examples we may therefore take the so-called polygynœcial fruits, which by our definition must be excluded from true fruits; and others such as the strawberry, apple, &c. The strawberry is a pseudocarp, the fruit consisting of numerous small achenes, while the enlarged fleshy axis forms the chief part of the pseudocarp. The rose-hip—a pseudocarp which was formerly known as the *Cynarrhodum*—is a hollow receptacle modified and enlarged, with achenes. The pome is another undoubted pseudocarp, although generally considered to be a true fruit; but its relation to the *Cynarrhodum* cannot be overlooked. It is a hollow receptacle enlarged and modified, with achenes. The relation of the drupe to the achene and nut, as is known to many, must be very close indeed, there being evidently much natural affinity between them, and but for the physiological modification of the mesocarp and endocarp they would not be separable—a point which becomes of much significance when we consider the fruits of such a natural group as the Rosaceæ. In the mulberry and fig we have pseudocarps, the fruits being small and dry; in the one the perianth becoming succulent, while in the other we have a hollow axis of inflorescence.

In the Archisperms the fruit is a nut, a dry indehiscent fruit, the hard pericarp consisting of two carpels. As fruits the cone and galbulus must disappear. The cone is a fertile branch of definite growth, easily distinguished from the vegetative branches. There is a primary axis bearing bracts (the scale-leaves), in the axil of each of which a small (generally two-flowered) inflorescence is produced. In the Cupressineæ this two-flowered inflorescence is replaced by a contracted cyme, like that of *Lamium*. The galbulus, which much resembles a berry, consists of three succulent bracts (scale-leaves), in the axil of each of which a small inflorescence forms. Only one flower is produced laterally, which is reduced to the ovule and two carpels. We have thus a pseudocarp formed of three nuts and three succulent bracts. The fruits of the Archisperms bear a very close resemblance one to the other; and as in the Metasperms (*e.g.*, the Rosaceæ) we see the close relationship of achene and drupe, so in the Archisperms we have the achene or nut of the yew contrasted with the drupe of *Salisburia* with the succulent exterior and ligneous inner part of the pericarp.

Having pointed out the relation of the drupe to the achene, it may be as well to state that there seems to be a relationship between the achene and the follicle, and from the follicle by the legume and capsule up to the berry. As we have shown that the pome must be

grouped among the pseudocarps, it is unnecessary to mention it further here. By the separation of the pseudocarps from the true fruits I believe that the classification of fruits will be considerably simplified.

ON SCHIZOBASIS, A NEW GENUS OF LILIACEÆ FROM CAPE COLONY.

BY J. G. BAKER, F.L.S.

SCHIZOBASIS, *Baker*.—Perianthium 6-partitum segmentis ligulatis æqualibus dorso uninervatis, flore expanso falcatis, marcescentibus post anthesin supra basin circumscissis, apice cohærentibus spiraliter convolutis capsulam immaturam calyptratim coronantibus. Stamina 6 inclusa, filamentis hypogynis applanatis subæqualibus rectis antheris oblongis versatilibus. Ovarium globosum sessile ovulis in loculo 2 geminis collateralibus ascendentibus; stylus filiformis subrectus ovario æquilongus; stigma punctiforme. Capsula sessilis depresso-globosa loculicide trivalvis, seminibus in loculo 2 triquetris, testa nigra membranacea. Herba bulbosa capensis foliis hysteranthiis (ignotis) caule flexuoso suberecto gracillimo floribus parvis anthericoideis copiose racemoso-paniculatis.

S. MACOWANI, *Baker*, species sola.

Inter frutices prope Somerset east, *Mac Owan*, No. 1847.

Bulb globose, 1—1½ inch thick. Leaves unknown, not developed at the time of flowering. Stem slender, wiry, flexuose, 3—4 inches long before it begins to branch, clothed near the base with short grey deflexed hairs. Racemes 1½—2 inches long, producing 12 to 20 flowers. Pedicels subpatent or ascending, always solitary, the lower 3—4 inches long. Rachis of the panicle 3—4 inches long, the upper branches simple, the lower forked. Bracts solitary, membranous, deltoid, very minute. Perianth whitish, ½ inch long. Capsule roundish, about a line long.

This curious little plant is an interesting addition to the tribe *Chlorogaleæ*, of which only three genera and four species were previously known: *Chlorogalum*, Californian, with two species; *Nolina*, from the Southern United States, with one species; and *Bowiea*, Cape, also monotypic. *Schizobasis* comes nearest the first of the three, differing considerably in ovary and perianth. The spiral twisting of the segments of the perianth after the flowering is over is similar to what occurs in *Casia*, and the section *Streptanthera* of *Anthericum*.

SHORT NOTES AND QUERIES.

ECHIMUM PLANTAGINEUM IN ENGLAND (see p. 20).—I have pleasure in forwarding a specimen of this plant to you collected at St. Just, Cornwall, last September. Mr. Ralls was the discoverer, and described to me the locality. This is a short mile from the town, chiefly in a sandy, weedy field on high ground not far from the sea. The plant was growing freely, and some straggling plants were seen on waste

ground and banks around; how long it may have flourished there it is impossible to determine, the spot being little frequented and some distance from any road.—ELIZ. A. LOMAX. [Mrs. Lomax has also sent specimens to the Bot. Exchange Club, and Dr. Boswell-Syme, who has examined them, writes: “I think there cannot be any doubt about the *Echium* being *E. plantagineum*. The Cornwall specimens are much less robust than the Jersey ones, and look as if grown in a soil and exposure which did not suit them; the leaves are thin as if grown in shade.” Two young specimens quite like the Cornwall ones are contained in the herbarium of the British Museum, labelled “*Echium violaceum*; Isle of Wight, Mrs. George Gray,” having been received from the late Mrs. Robinson in 1847. This is also, I believe, an unrecorded locality for *E. plantagineum*.—Ed. Journ. Bot.]

PLANTS OF PENZANCE.—During a short visit to Penzance last autumn I came across several specimens of two yellow labiate plants which my “Hooker” did not enable me to identify. One of these I find is *Stachys annua*, L.; with regard to the other I have been favoured with the following note from Dr. Boswell-Syme:—“Your labiate is *Sideritis romana*, L. I never saw the plant alive, so cannot say what is the colour of the flower, of which various accounts are given. Woods’ ‘Tourist’s Flora’ says, ‘Cor. yellow without spot’; Koch, ‘Cor. alba, labium superius quandoque colore roseo fucatum’; Gren. et Godr. Fl. de France, ‘Corolle blanche.’” I need only say that the plants I saw were yellow (primrose) with a dark spot. The locality for both these plants is the well-known green, bordering Mount’s Bay, which connects Penzance with Marazion. It may be of interest if I put on record some other plants which I found in the vicinity of Penzance. On the green occur *Delphinium Consolida*, L., sparingly; *Reseda fruticulosa*, L., maintaining its stand in its 1835 habitat, given in the New Bot. Guide; *Trifolium subterraneum*, L., and *Anagallis cærulea*, All., not with lilac flowers, however, as given in the New Bot. Guide, though I expect the locality is the same. On the adjacent sandy shore I found, with *Cynodon Dactylon*, Pers., *Bupleurum rotundifolium*, L., *Centaurea Calcitrapa*, L., and *Panicum miliaceum*, L. *Borago officinalis*, L., is somewhat common in the district, and *Silene anglica*, L., is to be met with occasionally in the fields. I did not find *Hypericum linariifolium*, Vahl., at Cape Cornwall, nor *Scrophularia Scorodonia*, L., at Newlyn, &c.—R. TUCKER.

PALMS OF TRINIDAD.—Mr. H. Prestoe writes to Dr. Hooker from the Bot. Gardens, Trinidad, January 25th, 1873:—“As to the Trinidad Palms, Grisebach is scarcely correct. In some places there seems to be confusion, and there is a deficiency of several species. Taking the genera as they occur in Grisebach’s ‘West Indian Flora,’ I may mention *Sabal mauritiiformis* as not being to my knowledge indigenous. Fine trees are growing in the garden, and these I think must have furnished the specimens Crueger sent to Europe. *Thrinax parviflora*, *radiata*, *argentea*, and *excelsa* are all found here as indigenous plants. Of *Mauritia* we appear to have both *setigera* and *flexuosa*—the

smooth and prickly kinds, as these are known here. Of *Jessenia* (*Ænocarpus*) I believe we have two distinct kinds, the second one being probably the *polycarpus* of Karsten. Of *Euterpe*, besides *oleracea*, we have a low arundinaceous kind on the hills, and a tall glaucous-leaved kind on the sandy flats beyond Arima. This latter kind is now very rare. The *Oreodoxa oleracea* is of course common and very distinct; but if there is much importance in the character as given by Grisebach of trunk thickened at the middle, our second species is not *O. regia*, Kth. *Geonoma* is a well-marked and not uncommon species here, but *G. oxycarpa* I have never met with. *Hyospathe pubigera* is also a well-marked mountain species, so also is *Manicaria Jaccifera* in the wet gravelly flats. I do not regard the entirety of the leaves as a distinguishing character; one finds entire and very much pinnatifid leaves on the same plant. Of *Desmoncus* we have two very distinct species, say *D. major* and *D. minor*. Of *Bactris* we have at least three species beyond what Grisebach gives to Trinidad. I cannot match our very commonest species with either of his descriptions. Those I have matched are *B. simplicifrons*, Cuesa, and *Cruegeriana*. *Astrocaryum aureum* is a very distinct and striking species along the south coast in poor sandy districts. Of *Acrocomia*, *sclerocarpa* seems our only species. Of *Maximiliana* we have both *caribæa* and *regia*; the first quite common, the latter rare, but certainly indigenous. In *Pandaneæ* we have two other distinct plants besides *Carludovica Plumieri*, probably *gracilis* and *insignis*."

PINE POLLEN IN LAKE MICHIGAN.—At the Dubuque meeting of the American Association, Dr. R. H. Ward made a report on a specimen of viscid-looking water from Lake Michigan, near Racine. The water of the lake was similarly thickened for miles, and was generally believed by the neighbouring residents to be of an infusorial character. It contained no infusoria worth speaking of, but was almost filled with pine pollen, which was interesting from its enormous quantity, and from the fact that its source could not have been near by, but must have been in the pine forests far to the north, the pollen being brought down by the southerly current along the western shore of the lake.—*American Naturalist*, Feb., 1873.

EARLY FLOWERING OF HERACLEUM.—The accompanying specimen of *Heracleum Sphondylium* was gathered to-day (Feb. 20th) in a hedge-bank by the roadside about half a mile from the village of Hatfield, Herts.—R. A. PRYOR. [The plant sent by our correspondent is coming into flower, the marginal flowers of the umbels being expanded, the inner ones in bud. Its flowers are remarkable in having petals of a dark reddish-purple colour.—*Ed. Journ. Bot.*]

THE IODINE TEST FOR FUNGI.—Will you allow me to thank Mr. M. C. Cooke for calling my attention (p. 92) to certain recent works in which he says are recorded the results of the application of iodine to the hymenium of *Pezizæ*? He is mistaken, however, in saying that Fuckel makes any reference to the subject in his "*Symbolæ Mycologicæ*," either in the body of his work or in the "*Erster Nachtrag*" of 1871 as far as I am able to discover.—W. PHILLIPS.

Extracts and Abstracts.

ON RUBUS IDÆUS, L.; ITS AFFINITIES AND ORIGIN.

By F. W. C. ARESCHOUG.

Among the fruticose *Rubi* now growing in Europe, *R. Idæus*, L., seems to be the most isolated species. All the others are so closely connected by intermediate forms, that they may be said to form a continuous series; but this species has no intimate relation with any of them. The chief character of *R. Idæus*, L., lies in its fruit separating from the receptacle; but there are also many other peculiarities. In the first place, I may mention that the bark scales off more or less completely from the stem during the second year, which is not the case with the other shrubby Brambles growing in Europe. In these the fruit is usually dark, of a deep red or blue colour, whilst that of *R. Idæus* is crimson or amber-coloured. Further, *R. Idæus*, L., has a great tendency to produce shoots from the subterranean parts, and very often you may find such shoots at a distance of many feet from the shrub from which they derive their origin. According to Prof. Babington (*Brit. Rubi*, p. 42), this species has a creeping rhizome, which is with probability supposed to produce the buds. As I have had no opportunity of examining the development of *R. Idæus*, L., from its germination, I cannot with certainty decide whether the subterranean parts from which these shoots proceed are rhizomes or true roots. Their anatomical structure, however, agrees with that of the root, in wanting pith; neither are they covered with aciculi and scales, both of which are not wanting on the subterranean parts of the shoots. I therefore suppose the root to produce the buds, and the same conclusion is also made by Kuntze (*Reform. deutscher Brombeeren*, p. 26). This production of buds on the root I have never seen in any other European species. However, I cannot omit to mention that Dr. Focke (*Nachträge zur Brombeerflora der Umgegend von Bremen*, p. 795) represents *R. fruticosus*, L. (*R. plicatus*, Whe.), as often propagating itself in the same manner as *R. Idæus*, L., though I never yet succeeded in proving the assertion. To the peculiarities already indicated as characterising *R. Idæus*, L., many others may be added which are more or less rarely to be found in other species. Not to mention that the flowering season of this species begins much earlier than that of the others, so that its fruit has come to maturity when that of the other species has but just begun to be formed, it may be sufficient to refer to the always erect and very glaucous stems; the setaceous purple prickles; the pinnate leaves covered with stellate hairs above; the few-flowered corymbose panicles, the lower of which come from the axils of the perfect leaves; the pendulous flowers; the narrow, always erect petals; the short stamens, erect or inclined towards the inside, which are all of equal height, and arranged in a close whorl; and the downy fruit—all which characters are either not at all, or at least very seldom, found in the other European species.

In some respects, however, one may perhaps compare this species with two other natives of Europe, viz., *R. suberectus*, Ands., and *R. cæsius*, L., or rather *R. pseudo-Idæus*, Whe. With *R. suberectus*, Ands., it agrees only in its erect stem and small setaceous purple prickles. The fact of the leaves of *R. suberectus*, Ands. having a disposition to become pinnate is, in my opinion, no reason at all for endorsing the view of a more intimate relation between that species and *R. Idæus*, L., for the following reason:—When the leaves of this latter are pinnate, they are perfectly so, every pair of leaflets being separated from the others by the prolongation of the petiole; but in *R. suberectus*, Ands., when its leaves are septenate, the two lowest pairs of leaflets are not separated, but inserted at the same spot, and in place of one terminal leaflet there are three, of which the lateral ones are sessile and approximated to the terminal one. Such a division of the terminal leaflet is not very unusual in several others of the European *Rubi*, particularly in the group of *R. corylifolii* (e.g., *R. pruinusus*, Arrhen.). Consequently the resemblance of these species, when compared with the peculiarities characteristic of one of them, *R. Idæus*, L., is really too insignificant to give us any right to suppose a nearer relation existing between them. The opinion that *R. suberectus*, Ands., is a hybrid between *R. Idæus*, L., and *R. fruticosus*, Ands. (*R. plicatus*, Whe.), appears little more correct. If that were the case we should have reason to suppose that that form would have some of the peculiarities belonging to one of the supposed parents, viz., *R. Idæus*, L.; but, as has already been mentioned, this is not the case. Besides, hybrid forms graduate generally into the parents; but such intermediate forms between *R. suberectus* and *R. Idæus* have never, to my knowledge, been found. On the other hand, the intimate relation of *R. suberectus*, Ands., to *R. fruticosus*, L., is evident, and intermediate forms are by no means wanting (e.g., *R. fissus*, Lindl.). Besides, in the determination of this point we must not forget that *R. suberectus*, Ands., grows over vast spaces of land where we do not find *R. fruticosus*, L.; for instance, the former species is found in the interior provinces of the South and the Middle of Sweden, whilst the latter is confined to the coast provinces, being very seldom seen in the interior of the country, and then only in the southernmost part.

In the group of fruticose Brambles characterised by thin green leaves, and prevalent in the North of Europe, *R. suberectus*, Ands., is analogous to *R. Idæus*, L., which, however, belongs to a quite different group. On another occasion I hope to show that *R. suberectus*, Ands., is the oldest, and consequently also the least variable, species of all in the group it represents. It is the very same form that grows in Sweden, Norway, Denmark, Great Britain, and in the North and Middle of Germany.

The inclination of many authors to suppose all intermediate forms of this genus to be hybrid plants, without any attempt at proof—an inclination that culminates in the work of Kuntze—seems to be founded upon ignorance of the laws which regulate the formation of species. Every type produces a number of forms, which are analogous to the forms produced by related types. And the forms developed in this manner are very often supposed to be hybrids between the species which constitutes the most characteristic form of their type, and

the species which are analogous to them. Thus a great many forms have been developed from *R. tomentosus*, Borkh., which is prevalent in the South of Europe, and many of these forms are analogous to species growing in the Middle of Europe. And therefore they are suspected to be hybrids between these species and *R. tomentosus*, Borkh. On the other hand, if the analogy be extended to all the essential parts of the plant, we find that authors have combined these analogous forms to make up a single species. It has doubtless seemed surprising to many that one author believes *R. thyrsoides*, Wimm., to be intimately connected with *R. tomentosus*, Borkh.; another with *R. discolor*, Whe.; and I myself incline to the opinion that *R. thyrsoides* from the North of Europe is very nearly related to *R. corylifolius*, Sm. All these different opinions are to a certain degree correct, but authors have had different though analogous forms in view. The *R. thyrsoides* of England and France has its origin from *R. discolor*, Whe.; that of the South of Europe from *R. tomentosus*, Borkh.; and the North European *R. thyrsoides* from *R. corylifolius*, Sm.

I believe, therefore, that I have reason for supposing *R. suberectus*, Ands., neither to belong to the same type as *R. Idæus*, L., nor to be a hybrid between that species and *R. fruticosus*, L. But the intermediate forms which connect *R. cæsius*, L., with *R. Idæus*, L., and which have been named by Weihe *R. pseudo-cæsius* and *R. pseudo-Idæus*, are real hybrids, produced by these species. For they have the more important characters of both *R. cæsius*, L., and *R. Idæus*, L., between which they oscillate, if I may so speak, to such an extent that they graduate now into one, now into the other, of the parents. Usually the fruit is dark, but I have found it on the true *R. pseudo-Idæus*, Whe., to be crimson, and to separate from the receptacle, as in *R. Idæus*, L.; the flavour of its fruit is, however, the same as in *R. cæsius*.

By these remarks I have intended to show that the species in question is more isolated than any other of the European *Rubi fruticosi*, and that the species which seem to connect it with these are either analogous forms belonging to other groups, or hybrids. The circumstance is the more remarkable as this species has a great propensity to vary. It is usually the case that species much isolated from other species of the same genus have very little tendency to vary. There can, for instance, hardly be any confusion in the nomenclature of the herbaceous Brambles, as their tendency to form varieties is very strongly restricted. As I have reason to suppose that these species belong to an older flora of Europe than the fruticose Brambles, it is probable that they have had time enough to exterminate the related forms, which were possibly developed with them from their common ancestors. On the other hand, species which very much vary are more or less completely connected with each other, just as with our fruticose Brambles. But *R. Idæus*, L., though greatly variable, produces no intermediate forms connecting it with the other European species, and this circumstance seems to me to be of such importance that I consider it as belonging to another type. Its stem may be glabrous or downy; furnished with numerous prickles, or nearly unarmed; and the prickles themselves are sometimes setaceous, some-

times stronger, deflexed, and almost sufficient to wound (*R. Idæus*, L., var. *maritimus*, Arrhen.). Still more do the leaves vary, being pinnate, ternate, or even simple and cordate (for instance, on the flowering shoots of *R. Idæus*, L., var. *anomalus*, Arrhen.*), while the leaflets are either hairy above or covered with stellate hairs, or glabrous, sometimes even on the under-side (*R. Idæus*, var. *viridis*, fl. Frib.). The leaflets are for the most part ovate-lanceolate, but may also, when ternate, be roundly ovate, nearly orbicular. A form from Lapland (*R. Idæus*, L., *elongatus*, Læst.) has elongated lanceolate leaflets. On the sea-coast of the East of Sweden there is a remarkable form, named *R. Idæus maritimus* by Arrhenius, in many respects different from the typical form; its leaflets are thick and plicate, like those of *R. fruticosus*, L. What has now been said is enough to show that *R. Idæus*, L., is a very variable species, but that its variability is limited in this way, that no forms connecting it with the other species now living in Europe are produced by its means.

A glance at the influence which climate exercises on the production of forms in the genus *Rubus* also appears to show that *R. Idæus*, L., does not belong at all to the same type as the other European species. In the North of Europe glabrous forms with thin green leaves prevail, in the East glandular, and in the South white-felted forms (*Rubi discolors* and *tomentosi*). On the shores of Western Europe are also found many glandular forms, produced by the influence of the oceanic climate; but these do not appear to be quite identical with the glandular forms of the East of Europe (comp. F. Areschoug, "Om de Skandinaviska *Rubus* formerna af gruppen *Corylifolii*" ("On the Scandinavian forms of the group *Corylifolii*") in Bot. Notiser, 1871, Nos. 5 and 6). The forms (*R. suberecti* and *corylifolii*) whose exterior organisation is best accommodated to the climate of the North of Europe, and which for that reason are prevalent in that region, are marked by glabrous stems, large, thin, and green leaves, and generally by their disposition to be very few-flowered. Only when growing in places exposed to the sun do *Rubi corylifolii* become white-felted like the forms from southern countries. The *Rubi glandulosi* and *tomentosi*, which are to be found, for instance, in Sweden, probably migrated into that country after they had already got their typical form. But these species have also in a manner been forced to accommodate themselves to the climatic conditions of that country, and appear, even if growing on exposed spots, to have undergone the same change as that which in their native countries is the effect of shade. The thin and green leaves, which are characteristic of *Rubi* from the North of Europe, promote transpiration, so necessary for nutrition. At a low temperature, and in a humid atmosphere, the thick white-felted leaves would hinder that process. Now *R. Idæus*, L., usually has the leaves white-felted on the under-side, and covered with stellate hairs above, characteristics of the *Rubi discolors* and *tomentosi* prevailing in the South of Europe; but by the thinness and the large surface of

* Babington (Brit. Rubi, p. 46) does not believe that *R. Idæus anomalus* of Arrhenius is the same form as *R. Leesii*, Bab. As I have had an opportunity of seeing specimens of the form named by Arrhenius himself, I can positively assert that these names are synonymous.

its leaves it reminds us of the northern forms. Thus, if we were to judge from its characters, it should belong to the South of Europe, which, however, is not the case. In the South of Europe we meet with this species only in woody mountain tracts, whilst in the North it is very common, even in the most northern part of Norway, where, as Wahlenberg (*Flora Lapponica*, p. 146) tells us, it is “*omnium vulgatissimus*.”

When I had become acquainted with the influence which a northern climate exercises on the general character of the fruticose Brambles in Europe, it was for a long time an insoluble problem to me how *R. Idæus*, L., though its whole exterior organisation betrayed the traces of the influence of a southern climate, could be most common in the North of Europe. A more extensive knowledge, however, of extra-European forms has solved this seeming contradiction. For this species did not originally have its home in Europe, but its origin is to be found in the East of Asia, viz., Japan and the adjacent countries, or perhaps in North America. The species which are most nearly related to it are at present to be found in the last-mentioned region of the world. Many of the North American *Rubi* are marked by their fruit separating from the receptacle, and by their bark scaling off from the stem, as is the case in *R. Idæus*, L. (e.g. *R. odoratus*, L., *R. Nutkanus*, Moç., *R. deliciosus*, Torr., *R. strigosus*, Michx., *R. borealis*, Spach., *R. occidentalis*, L., *R. leucodermis*, Dougl., *R. spectabilis*, Pursh.). This last-mentioned character seems to mark all the North American species whose fruit separates from the receptacle, and I believe this to be of such importance that I consider all these species to belong to the same group, which I call the North American type.* That group includes species as well with simple leaves as with pinnate or quinate ones, and its species are not only found in the northern part of North America, but also in the South—for instance, in Mexico (*R. trilobus*, Moç et Serr.). However, it must not be imagined that all the North American *Rubi* belong to this group, for there are also species of some other types, among which one is very closely related to our *R. suberectus*, Ands., viz., *R. villosus*, Ait. The resemblance between *R. Idæus*, L., and the species of the North American type is not limited to the mode of separation of the fruit and the bark. The crimson or amber colour of the fruit which marks *R. Idæus*, L., and separates this species from all the other European *Rubi*, is also found in some North American species. It is true, to be sure, that reports about the colour of the fruit in all extra-European *Rubi* are very unsatisfactory; but in the *Flora of North America* by Torrey and Gray it is indicated that the fruit of some other North American species besides those of *R. Idæus*, L., are red or yellowish (*R. odoratus*, L., *R. spectabilis*, Pursh.). *R. Nutkanus*, Moç., has the fruit red, but I do not know whether it is ever yellowish. It is also not very uncommon in the North American species to find a downy fruit, and erect stamens all of equal height and arranged in a closed verticillus

* It must, however, be remembered that there is one species in North America, *R. ursinus*, Cham. et Schl., that has a bark scaling off from the stem, notwithstanding that its fruit is deciduous with the receptacle (Torrey and Asa Gray, *Flora of North America*, p. 456).

(*R. spectabilis*, Pursh.). The barren stem of our species is not seldom somewhat flexuous, which is scarcely the case with any of the other European species (excepting the very different *R. Güntheri*, Whe.), but occurs in some species of the North American type (e.g., *R. Nutkanus*, Moç., *R. velutinus*, Hook. et Arn., *R. spectabilis*, Pursh.). In consequence of this peculiarity and the pale-brown colour of its bark, not found in the other European species, the stems of *R. Idæus*, L., when deprived of their leaves become very like those of some North American species (*R. Nutkanus*, Moç., *R. spectabilis*, Pursh.).

There are, however, three North American species especially—viz., *R. strigosus*, Michx., *R. borealis*, Spach., and *R. occidentalis*, L.—which have a very strong resemblance to our species. The two first-mentioned especially have so close a relationship to *R. Idæus*, L., that they may perhaps be considered rather as varieties of it than as distinct species; and *R. occidentalis*, L., has many important characters of *R. Idæus*, L., such as—not to repeat the peculiarities characterising the North American type—the erect stems, glaucous at the base; the often pinnate leaves, white-felted on the under-side; the downy fruit; and lastly, the habit. Some authors have even combined this species with *R. Idæus*, L. *R. occidentalis*, L., is marked by its dark-coloured fruit; but according to Arrhenius, the variety *maritimus* of *R. Idæus*, L., when cultivated, sometimes acquires dark-coloured fruit. The same variety has the acini furrowed on their outside, which is also the case in some species of the North American type (e.g., *R. Nutkanus*, Moç.).

There can then scarcely be any doubt that *R. Idæus*, L., is much more closely related to certain North American species than to any of the European ones. It now remains to try to discover whether this species is descended from any form still living in North America, or whether it had its origin in some other region of the world. If the first supposition had the better foundation, it would be probable that our species had developed itself from *R. strigosus*, Michx., or *R. borealis*, Spach., and that during its spread over Asia and Europe it had by degrees been changed into *R. Idæus*, L. Neither the great distance between the old and the new continents, nor the vast territory over which that species in such a case had to pass before it reached Europe, would in the least degree affect the probability of such a supposition. For it is very probable that the Asiatic and North American floras have reciprocally mixed with each other by passing Behring's Straits and the islands which in its neighbourhood form a bridge between the two continents. In confirmation of such an opinion we may refer to the fact that in the Scandinavian peninsula we find a great many non-arctic plants which have spread as far as North America (comp. F. W. C. Areschoug, "Bidrag till den Skand. Vegetationens Historia" ("Contributions to the History of the Scandinavian Vegetation"), in "Acta Universitatis Lundensis," 1866); and on the other hand, there are many plants growing in Europe which have probably migrated hither from North America by Asia. The species now in consideration is known to be spread over the whole North of Europe and Asia, even as far as to Mandschuria and Japan. Thus no obstacle of that sort to the view of its migration from North America seems to arise.

But, on the other hand, the North American *Rubi* themselves appear to trace their origin from Japan and the north-east of Asia, whence North America has received so very large a proportion of its vegetation. Except *R. strigosus*, Michx., there are, however, in these parts of Asia no *Rubi* quite identical with the North American forms, though some growing in Japan have so close a relationship to them that they may indeed be considered as modified forms. This is particularly the case with the simple-leaved *Rubi*, from which forms those with divided leaves have been probably developed (comp. Focke, "Die synthetische Methode in der Systematik" in the "Jenaischen Zeitschrift für Med. und Naturwiss.," v., p. 107). Thus the Japanese species, *R. trifidus*, Thunb., *R. palmatus*, Thunb., and *R. Wrightii*, A.Gr., very closely resemble *R. odoratus*, L., and *R. Nutkanus*, Moç., though I have had no opportunity of learning whether their bark scales off from the stem and their fruit separates from the receptacle. On the other hand, there are in Japan, besides *R. Idæus*, L., many other forms—e.g., *R. Coreanus*, Miq., *R. Thunbergii*, Sieb. et Zucc., *R. Oldhamii*, Miq., and particularly *R. phœnicolasius*, Maxwcz., and *R. strigosus*, Michx., which much resemble our species.

I therefore believe it to be very likely that *R. Idæus*, L., as well as the North American forms most closely related to it, have their origin from species which primitively grew in Japan and adjacent countries. The variety *anomalus*, Arrhen., appears by its simple leaves either to point back to the form from which *R. Idæus*, L., is descended, or perhaps to be the primitive form itself. At present it is impossible to decide which of these hypotheses is the more probable. Not unfrequently also in other *Rubi* one may find some leaf or other the form of which seems an accidental modification of the normal one, and which is probably to be considered as a return to the form of leaf which characterised the primitive species. Thus, for example, in *R. glandulosus*, Bell., I have seen leaves on the flowering shoots which were simple and lapped, and very much resembled in form those of many species from the Himalayas. These Himalayan species, indeed, in many other respects so nearly approach *R. glandulosus*, Bell., that it does not seem improbable to me that this species derived its origin from some one among them. Perhaps such a return has become constant in *R. Idæus*, L., var. *anomalus*; but it is also possible that this variety is the primitive form, as has already been observed. Focke ("Ueber *R. Leesii*, Bab." in Jenaisch. Zeitschr., b. i., p. 127) believes it somewhat improbable that this form should be the representative of a species about to become extinct, because it commonly grows in cultivated places where it can scarcely be protected. He supposes it to be a form which is developing itself into a species, and which in doing so has, with respect to its leaves, returned to the primitive form.* However this may be, the variety seems to prove that *R. Idæus*, L., is descended from some older form with simple leaves, and such forms are common both in Japan and in North America.

All the circumstances now related seem to me to render it very probable that the species in question, together with its relations, has

* For some later remarks of Focke upon *R. Leesii*, see Oesterr. Bot. Zeitsch. 1870, trans. in Journ. Bot. x. (1872.), p. 26.—[Ed. Journ. Bot.]

its origin from some form with simple leaves still growing in Japan or adjacent countries, or perhaps now extinct, though related to the forms still living there. According to Maximowicz (Diagn. brev. plant. nov. Japoniæ et Mandschuriæ, in Bull. de l'Acad. impér. des sc. de St. Petersbourg, t. xvii., p. 161), *R. Idæus*, L., and *R. strigosus*, Michx., the latter being by him considered as a variety of *R. Idæus*, L., grow in Japan and Mandschuria. From these countries *R. strigosus*, Michx., which extends towards the West as far as the Altai, has spread eastward over the northern part of North America, while *R. Idæus*, L., has migrated towards the West, over the North and Middle of Asia, into Europe.—[Translated and revised by the Author from the Swedish "Botaniska Notiser," 1872, pp. 168—181.]

RECENT ADDITIONS TO THE FLORA OF IRELAND.

BY ALEX. G. MORE, F.L.S., M.R.I.A.

IN a paper read before the Royal Irish Academy on the 10th of June last, and printed in the "Proceedings," vol. i., ser. 2 Science, pp. 256-293, I have brought together as far as possible the various additions which have been made to our knowledge of the localities and distribution of the native plants of Ireland, as drawn from the information which has accumulated in the hands of Dr. Moore and myself since 1866, when our book, the "Contributions towards a Cybele Hibernica," was published. The following abridgment embraces the more important plants and localities, as well as some additions and corrections:—

SUMMARY OF ADDITIONS.

Undoubted Natives—8.

Trifolium glomeratum.

Salix Grahmi.

T. subterraneum.

Draba rupestris.

Scirpus parvulus.

Galium cruciatum.

Aira uliginosa.

Pyrola rotundifolia.

The three last, printed in italics, have already been recorded as Irish, but in 1866 we did not consider that there was sufficient authority for their admission.

Natives, but doubtful as species—4.

Thalictrum Kochii.

Epilobium tetragonum (verum).

Hieracium tridentatum.

Potamogeton Lonchites.

Plants probably introduced—3.

Erysimum cheiranthoides.

Mentha sylvestris.

Tamus communis.

The two first have already been admitted by Mackay and others, but we are now for the first time able to give satisfactory localities.

Plants certainly introduced, but well established in the wild state—3.

Acorus Calamus.

Hippophae rhamnoides.

Cuscuta Trifolii (Colonist).

Casuals—i.e., plants certainly introduced unintentionally by man, and which cannot be considered permanent additions to the Flora, as they have not yet sufficiently established themselves, and some of them are likely to disappear from the few localities in which they have been observed—14.

Cardamine impatiens.

Valerianella carinata.

Brassica adpressa.

Crepis setosa.

Berteroa incana

Centaurea paniculata.

Malva borealis.

Carduus setosus.

Geranium nodosum.

Campanula rapunculoides.

G. phæum.

Mentha Requienii.

Oxalis stricta.

Cynosurus echinatus.

We have thus 32 plants, which, after deducting Casuals and few that have before been borne on the Irish List, will leave from 12 to 15 to be reckoned as genuine additions to the Flora. Still, this hardly increases the total number, since on the other hand 10 plants must be deducted, viz. :—

Species to be removed from the list.

Brassica oleracea. Not native, and nowhere well established.

Genista tinctoria. Not now to be found at Killiney. Some error.

Chrysosplenium alternifolium. Thought to have been planted near Belfast, and we fear that the other stations are erroneous.

Campanula latifolia. C. Trachelium mistaken for it.

Aretium majus. Identification uncertain, as the only specimen is imperfect.

Calamintha Nepeta. Was C. officinalis.

Chenopodium intermedium. Was probably C. murale.

Salix procumbens. Was S. phylicifolia.

Potamogeton lanceolatus. Was a form of P. polygonifolius.

Eriophorum alpinum. Some error or change of specimens.

The following are some of the more important of the localities recently discovered. The numbers refer to the districts employed in our book, and it is to be understood that whenever the letter D (district) precedes the numeral it indicates that the plant is an addition to the flora of that Province:—

Thalictrum Kochii, Fries. D. 8. Shores of Lough Conn, Mayo; A. G. M.

T. flexuosum, Bernh. D. 1. Islands in the lower Lake of Killarney; A. G. M.

Ranunculus pseudo-fluitans, Syme. 12. River Bush and River Bann; S. A. Stewart and R. Tate. Mr. W. P. Hiern refers the plant from Chapelizod to his form "*R. penicillatus*" of Dumortier, this differing from the restricted *pseudo-fluitans* by producing floating leaves.

R. acris, L. The mountain form appears to be *R. Friesianus*, Jordan, and was gathered lately on Ben Bulbin, Sligo, by D. M. and

W. T. Dyer, and in the Horse's Glen, Mangerton, A. G. M. The ordinary plant in Ireland is *R. tomophyllus*, Jordan.

Papaver dubium, L., var. *Lecoqii*, Lam. 5. On sandy banks at Baldoyle, with both white and yellow sap; W. T. Dyer and A. G. M.

Meconopsis cambrica, Vig. D. 10. Ballyskeagh hill, Tyrone; Dr. Sigerson.

Obs. *Cardamine impatiens*, Linn. Dr. E. P. Wright has drawn my attention to a specimen gathered by the Rev. W. M. Hind at Shane's Castle, and preserved in the British Herbarium at Trinity College, from which it appears that Mr. Hind's record of this species in the "Phytologist" was quite correct; but our careful correspondent, Mr. S. A. Stewart, has not succeeded in discovering the plant, and thinks, from the nature of the locality, that it may have been introduced. Hence we feel compelled for the present to leave its claims to a place in the Irish Flora undecided.

† *Sisymbrium Sophia*, L. 5. Sandhills by the creek at Donabate, and on the south shore of the estuary below Drogheda; possibly introduced in all the Irish localities; A. G. M.

* *Erysimum cheiranthoides*, L. D. 7. In cultivated land and waste ground along the road for two miles between Parsonstown and Portumna, in Galway, and in the adjoining part of Tipperary; M. Dowd.

[*Alyssum calycinum*, L. Rediscovered at Portmarnock by Mr. H. C. Hart in 1867, and observed growing there sparingly in two small fields from 1868 to 1872.]

Draba rupestris, R.Br. D. 9. Very sparingly on the north side of Ben Bulbin, 1871; D. M. and W. T. Dyer (see Journ. Bot. ix., p. 299). Recorded in Withering's Bot. Arr., ed. 8., by Mr. E. Murphy as found by him in Leitrim and Sligo; *D. incana* having probably been gathered.

D. incana, L. D. 8. In great luxuriance on the southern shores of Lough Mask; F. J. Foot.

Cochlearia anglica, L. D. 4. In a salt marsh near Ferrycarrick Bridge, on the estuary of the Slaney! J. Morrison. D. 6.? Near Limerick, leaves only; I. Carroll. 10.? At Cloghcor, on the banks of the Foyle, but not in fruit; Dr. Sigerson. The Irish plant is identical with *C. anglica* as found in the north-west of England, and differs considerably from the var. *didyma* which occurs in the South of England. Only *C. officinalis* grows on Killiney Hill.

Helianthemum guttatum, Mill. D. 8. Abundant on Innisbofin Island, Mayo; (W. McMillan) S. A. Stewart.

Viola lutea, L. D. 4. On the banks of the King's River, near Lackan, Wicklow! H. W. D. Dunlop. D. 10. In the mountainous country near Bealyborough (Bailieborough); Annot. in Threlkeld, apud R. I. A. The plant of the sandhills at Roundstone belongs rather to *V. Curtisii*, and we now include under *V. Curtisii* the sandhill Pansies of the whole coast, except Lahinch and Miltown in Clare.

† *Acer campestre*, L. D. 9. Hedges about Sligo; D. M.

Geranium pratense, L. 12. Dunluce Castle, and all the north part of Antrim. About Ballintoy; R. Templeton, MS. On blown sand at Port Bradden; R. Tate. Mr. Tate has confirmed the accuracy

of Mr. Templeton's observations, and has found *G. pratense* much more frequent than *G. sylvaticum* on the north coast.

† *G. pyrenaicum*, L. D. 2. Roadside near Charleville, and a single plant in a pasture-field near Middleton; Rev. T. Allin. 5. Roadside banks near the Hill of Tara, Meath; A. G. M.

G. rotundifolium, L. D. 5. Rediscovered in 1867 on some old walls at Glasnevin! D. Orr.

Linum angustifolium, Huds. D. 3. Near Kilkenny; W. Archer. D. 6. Meadows between Woodford and Lough Derg; M. Dowd.

Ulex (nanus) Gallii, Planch. Ascends above 2000 feet on Carn Tual, to 1500 or 1600 on Mangerton, thus ranging much higher in the West of Ireland than in England; A. G. M.

Obs. *Genista tinctoria*, L. Has not been rediscovered in the only locality given by Mackay, and we much fear that a dwarf and procumbent state of *Sarothamnus scoparius* which grows on Killiney Hill and Howth has been mistaken for it.

[*Medicago falcata*, L. Portmarnock; Flor. Hib., but not seen recently. Terminus, York Street, Belfast; W. Millen. Evidently introduced. This was intentionally omitted in our book, as having no claim to be considered established.]

Trifolium scabrum, L. D. 2. Sands at Fanisk, Youghal; Rev. T. Allin. D. 4. Near Newcastle and Killoughter, Wicklow; A. G. M. Between Kilcool and Greystones; H. C. Hart. It is this species rather than *T. striatum* which has been mistaken for *T. maritimum* in Ireland.

T. glomeratum, L. D. 4. By the riverside near the railway station at Wicklow, growing with *T. subterraneum*, 1869; D. M. (see Journ. Bot. viii., p. 192).

T. subterraneum, L. D. 4. By the riverside at Wicklow, June, 1867; A. G. M. (see Journ. Bot. vi., p. 208).

Sanguisorba officinalis, L. Near Carnlough, Antrim; W. Hancock.

Agrimonia odorata, Mill. D. 4. Near Enniskerry; A. G. M. D. 8. Very fine near Clifden, Connemara; never seen by me on the limestone, where *A. Eupatoria* seems to take its place; A. G. M.

Epilobium tetragonum, L. (typical). D. 2. On the east side of the county of Cork! (Rev. T. Allin) W. T. Dyer. D. 5. By the roadside west of Carrickmines! Prof. A. Dickson. These are the only localities at present known.

Lepigonum rubrum, Fries. D. 4. Strand at Ballyconigar! Wexford; J. Morrison. On Vinegar Hill! H. Robinson. 12. South-east shore of Lough Beg, near Toome; S. A. Stewart. This seems quite rare in Ireland.

Saxifraga Hirculus, L. D. 3. Bogs near Mountrath, Queen's County; J. Morrison.

S. aizoides, L. D. 11. In a gully on the north side of Slieve League, Donegal! H. W. D. Dunlop.

S. granulata, L. D. 4. On the sandhills south of Mizen Head, Wicklow; D. M. Brittas, 1866; J. Morrison. D. 10. On the mound at Rathtrillick, Armagh; S. A. Stewart. 12. Plentiful in Belvoir Park; Belfast Nat. Field Club Report, 1871.

Hedera Helix, L. The so-called "Irish" Ivy has not yet been found growing in any place where it can be considered native. The Ivy of Kerry and Aran is only typical *H. Helix*. Our var. *Hodgensii*

agrees so closely with the cultivated *H. digitata* of Lodd. Cat. that it is probably only a garden escape.

Galium cruciatum, L. D. 12. This plant was recorded in the "Antient and Present State of the County of Down," 1757, as occurring then "among the rubbish of the Cathedral of Downpatrick"; and the authority "Is. Butler," showing the probable author, is added as a note in a copy of Threlkeld belonging to the Royal Irish Academy. It was rediscovered about 1842 by Professor J. E. Hodges, at the bottom of a field adjoining the marshes near the Cathedral, and on the side of the old Rath; as we learn from a letter addressed to W. Thompson, in June, 1842, and for the knowledge of which we are indebted to our active correspondent, Mr. S. A. Stewart. Again gathered in 1868, by the Rev. W. E. Mulgan, who has observed it for the last few years growing in a field near Downpatrick Cathedral (see Journ. Bot. viii., p. 80). D. 10. Plentiful in boggy ground by the side of a small lake at Colebrooke, Fermanagh, 1869 (found by Mr. T. O. Smith); H. C. Hart.

G. uliginosum, L. D. 7. On a bog near Multyfarnham, Westmeath, sparingly, 1871 and 1872; D. M. D. 12. In the county of Antrim; Rev. W. M. Hind (in Herb. Trinity College); Dr. E. P. Wright.

[*Valerianella carinata*, Lois. D. 10. Abundant on hedgebanks for a mile along a by-road crossing Holywood Hill, near Dundonald, Co. Down; S. A. Stewart, 1871. If permanent in this locality it will deserve to be considered a "Colonist"; for the present it ranks as a "Casual" only.]

Diotis maritima, Cass. D. 4. Near Carnsore Point, Wexford; (John Waddy) Syme's Engl. Bot.

Artemisia maritima, L. 5. Estuary of the Boyne below Drogheda; A. G. M. Dundalk! 1868; J. Marsden.

* *S. squalidus*, L. Mr. Carroll continues to find the supposed hybrid *S. squalido-vulgaris* about Cork, and has no doubt as to the parents.

Senecio Jacobæa, L. Var. without rayed florets. *S. flosculosus*, Jord. On several parts of the coast, but local. D. 1. Ferriter's Cave, Kerry; A. G. M. D. 2. Near Tramore, Waterford; J. Woods in "Phytologist." D. 4. Near Churchtown, Wexford; (J. Waddy) Syme's Engl. Bot. D. 5. Sandhills between Gormanstown and Maiden Tower, in many places; A. G. M. 6. In Great Aran; D. Oliver. Frequent in Aran, but the ordinary form occurred in one field only; H. C. Hart. D. 8. On several islands off Connemara, and in the Mullet, Mayo; A. G. M.

Obs. *Arctium majus*, Schk. Mr. Allin has not succeeded in finding this plant in the county of Cork, and we have as yet seen no Irish specimens. Prof. C. C. Babington informs me that his specimen is too imperfect to be considered quite satisfactory.

A. intermedium, Lange. *A. pubens*, Bab. D. 6. In the Isles of Aran; H. C. Hart. 12. Common on the coast of Antrim, where *A. minus* has not been observed; R. Tate.

(To be concluded in the next number.)

Notices of Books.

A Synopsis of the British Mosses, containing descriptions of all the Genera and Species (with localities of the rarer ones) found in Great Britain and Ireland, based upon Wilson's *Bryologia Britannica*, Schimper's *Synopsis*, &c. By CHAS. P. HOBKIRK. London: Reeve and Co. 1872. (Small 8vo, pp. 196.)

THIS little book is well printed and elegantly got up, and to a student who is already pretty well acquainted with the subject, no doubt will be useful for ready reference to the essential characters of any species that may be under observation. The author in his preface tells us that though his work is mainly a compilation, yet "nearly every species has been carefully examined under the microscope before being described," and the characters compared with published descriptions. The work opens with an analysis of genera occupying twenty pages, in which, besides the more important characters derived from the fruit and its parts, trivial ones—*e.g.*, the monoicous or dioicous position of the inflorescence, annual or perennial duration, &c.—are also introduced. Following these come the descriptions of species, but without any indications of the natural groups or families under which the genera are now universally arranged, some of which, indeed, are as well marked as natural orders of Phænogamous plants. In these descriptions Wilson's book is closely followed, about one hundred additional species being added, the characters of which have been taken from various publications.

A few critical remarks seem necessary. *Gymnostomum* is retained as a genus, yet the species *calcareum* and *commutatum* are placed in *Weisia*; these can only be so arranged by those bryologists who regard the genus *Gymnostomum* as a heterogeneous collection of species, more naturally referred to other genera with which they agree in every particular but the presence of a peristome. *Dicranella* is still retained as a section of *Dicranum*, though a truly natural genus admitted by all modern authors; on the contrary, *Anacalypta* stands as a genus, yet C. Müller, Schimper, Mitten, and Lindberg properly unite it to *Pottia*. The species *P. latifolia* cannot be considered a British plant, and *Didymodon Jenneri* and *Anæctangium Hornschuchianum* should also have been omitted. *Bartramia gracilis*, Floerke, cannot take precedence of *B. Oederi*, Swartz 1800, Swartz having adopted Gunner's name, *Bryum Oederi* (*Flora Norvegica*, 1772). *Fissidens polyphyllus* is incorrectly referred to the West Indian *F. asplenioides*. *Leucodon Lagurus*, $\beta.$, is quite different from that Moss, and belongs to Schimper's genus, *Myurium*. *Leskea sericea* cannot be removed far from its ally, *Hypnum lutescens*, and neither it nor *rufescens* nor *subrufa* have any affinity with true *Leskeas*. *Thuidium*, *Thamnium*, and *Plagiothecium* certainly deserve a higher position than as sections of *Hypnum*. *Hypnum Stokesii* is not distinct from *H. prælongum*; *H. sulcatum* and *H. Breadalbanense* are, doubtless, only forms of *commutatum*; and *H. arcuatum*, Lindb., is the same as *H. Lindbergii*, Mitt. A third species

of *Fontinalis*, *F. gracilis*, Lindb., is omitted. *Dichelyma* is a very doubtful native.

On the whole, while recognising the usefulness of the present contribution to British Muscology, we are inclined to think that students of that branch of Botany are likely to feel that it only partially fulfils their wants, and will still look forward to a work where all our Mosses shall be fully described and adequately illustrated. A. B. C.

The Botanist's Pocket-Book, containing in a tabulated form the chief characteristics of British Plants. By W. R. HAYWARD. London: 1872. (Small 8vo, pp. 198.)

THIS, as its name indicates, is intended as a companion for the botanical collector in the field, and the author has therefore endeavoured to compress his material into the smallest possible space. This part of his purpose he has accomplished very satisfactorily, and gives us a little volume, less than half an inch thick, which professes to contain the diagnostic characters of all the British Phænogamous plants. This is effected by the use of a small clear type and numerous contractions. Each species occupies a single line of print across the two opposite pages; the left-hand one contains the names, situation, time of flowering, colour, and other similar particulars, whilst on the right-hand page we find the distinguishing characters. The order and classification followed is that of the "London Catalogue," with a few alterations, and most of the segregates are included and characters given for their discrimination. So far as can be judged from a rather superficial examination, the diagnoses seem framed with considerable care and judgment, the characteristics having been well selected and contrasted. Keys to the orders and genera are prefixed. A certain knowledge of British Botany being premised in those who consult the book, it is likely to prove useful for reference in the field; but of course it is only actual use that can test its value as a trustworthy companion. A rather large number of misprints in the spelling of the botanical names will require revision if the pocket-book should reach a second edition. H. T.

Proceedings of Societies.

LINNEAN SOCIETY.—December 19th, 1872.—Mr. W. G. Smith exhibited a specimen of *Batarrea phalloides*, one of four found in the Earl of Egmont's grounds near Epsom, and commented on the great rarity of the plant.* He gave some details of its structure, especially as regards its so-called spiral vessels, and also referred to its position in relation to other Fungi, e.g., *Clathrus*, *Phallus*, *Cynophallus*, and *Geaster*, drawings of these genera showing all stages of growth being exhibited. Mr. Currey made some remarks on the spiral-fibre cells and true wood-cells of *Batarrea*, and remarked upon the long intervals which intervene between the appearances of the plant,

* This species, hitherto very little, if at all, known out of England, has been recently found near Naples by Prof. H. de Cesati.—[Ed. Journ. Bot.]

referring them to meteoric causes. The following papers were read:—
 “On the Development of the Flowers of *Welwitschia*,” by Prof. W. R. McNab, communicated by Dr. Hooker. The male flower consists of four whorls of decussating parts, two outer perianth-leaves alternating with two inner, two primordial stamens each subsequently branching into three, and two (anterior and posterior) carpellary leaves, including, and afterwards developed considerably beyond, the *punctum vegetationis*. The female flower consists of two (lateral) outer parts, at first thought by Dr. McNab to be perianth-leaves, but subsequently determined to be carpellary, and the *punctum vegetationis* (nucleus of ovule) surrounded by a continuous ovular investment. Strasburger’s recently published observations generally accord with these independently worked out details, but he differs in considering the stamens to form two whorls, one of two and the other of four.—
 Dr. Masters brought forward for discussion some general principles of Morphology; he proposed to group all the various forms of organs in some such manner as the following, under which he thought the great majority of cases of variety in growth and development might be included:—Arrest, Exaltation and Perversion; in relation to Composition, Number, Arrangement, Form, Time, and Size. In the discussion which followed, a general opinion was elicited that it was inexpedient to alter existing terminology when well established, even where the terms in common use convey incorrect and generally abandoned views.

January 16th.—The following papers were read:—“Note on the genus *Nemocladus* of Nuttall,” by G. Bentham, President.—“Note on *Ternströmia Khasyana*, Choisy,” by Prof. Thiselton Dyer; shown by examination of the type to be identical with *Illicium Griffithii*, H.f. et T.—“On the Recent Synonyms of Brazilian Ferns,” by J. G. Baker. The author considered that a large number of the new species in Fée’s recent monograph were established on very insufficient grounds; out of about 180 described by that author, Mr. Baker could not admit more than about a tenth part. He exhibited a series of authentic specimens from Dr. Glaziov, of Rio, where Fée’s large herbarium is now located, and gave a list showing to which old-established species he referred the proposed novelties.—Mr. Grote exhibited drawings of branched specimens of Cocoanut-palm and Date-palm.

February 6th.—“On the Structure and Affinities of the *Aristolochiaceæ*,” by Dr. M. T. Masters. The author alluded to the wood structure, the false stipules, the so-called gynandrous condition, the absence of true styles and stigmas, and the arrangements for fertilisation. There are no very near allies, the *Dioscoreæ* being among the nearest. From its isolation, and from the fact that each of the warmer regions of the globe possess a structurally distinct group, the conclusion was arrived at that it was an ancient order in time, though no trace of it has been found in the fossil state. Remarks were also made on the alleged value of these plants as remedies for snake-bites: the remarkable concurrence of testimony on this matter seems to demand a more scientific scrutiny than it has yet received. Dr. Hooker pointed out the *Cytineæ* as a group allied to the *Aristolochiæ*. He said also that the absence of varieties could not *per se* be considered

as a proof of antiquity, and instanced Conifers, which, though a very ancient order, are highly variable. In reference to the use of *Aristolochia* in snake-bites, he stated that they, and indeed all such reputed remedies, were really but little used in India. Dr. Trimen alluded to a new species about to be described by Dr. Hance, which is largely employed in China [since published in this Journal, p. 72]. Remarks were also made by Mr. Stratton, Prof. Thiselton Dyer, and others. Specimens of Guaco and other products from the Kew Museum bearing on the subject were exhibited.

February 20th.—Mr. W. Sowerby exhibited specimens of *Poinsettia*, which had fruited for the first time in the Royal Botanic Society's Gardens.—“On a New Genus of *Podostemaceæ*,” by H. A. Weddell. The author, who is preparing a monograph of the order for the forthcoming volume of De Candolle's “*Prodromus*,” gave some details of the geographical distribution of the order. Only two species have been hitherto known from Tropical Africa, one being the recently described *Anastrophea* from Abyssinia, the other the widely diffused *Tristicha hypnoides*. The new genus is named *Angolæa*, and was found in Angola, West Tropical Africa, by M. Montero. Drawings of the plant accompanied the paper.—Prof. Thiselton Dyer exhibited a flower of *Lælia elegans*, which was very nearly regular, and possessed a remarkable conformation of the column; the single anther he considered to be one of the inner whorl of the hypothetical androecium, instead of the outer whorl, as is usually the case in the flowers of Orchids.—Mr. W. G. Smith showed a drawing of a new Fungus found on the stem of a Cycad in Mr. Bull's Nursery at Chelsea. It was quite gelatinous, and shortly stipitate. Mr. Currey considered it to be a species of *Laschia*.

March 6th.—“On the Homology of the Perigynium in *Carex* and *Uncinia*.” By G. Bentham, president. Two principal views of the nature of this structure have been given. Robert Brown, relying upon its being composed of two squamæ, considered that it represents a perianth, and Payer and Schleiden have adopted the same view, after an examination of its appearance at a very early stage. Kunth, on the contrary, believed it to be formed of a single scale, and to be an ordinary glume subtending the female flower on a secondary axis, of which the seta of many species of *Carex*, and of all the species of *Uncinia*—which cannot be considered as a genus distinct from *Carex*—is the continuation. If the perigynium is really formed of a single scale, Kunth's view is very plausible, but the two keels or principal nerves, which in most species end in two points or lobes, are strong evidences of its double nature. Kunth explains that circumstance by the suppression of the central nerve or keel owing to pressure, of which, however, there is no appearance in any species examined. Payer states also positively that the two are distinct at an early stage, and unite as they grow up; but implicit reliance is not always to be placed upon his having clearly seen the minute microscopic and obscure protuberances he delineates. Schleiden delineates the two parts of the perigynium and the seta as forming three parts of one whole; but his drawing is not to be depended upon, as he places them in a wrong position with relation to the axis and the subtending glume. Kunth confirms his views by a comparison with the palea and occasional seta of Gramineæ, but here the position of the two parts in the two orders is by no means

homologous. Independently of the relation to the other parts of the flower, the seta or prolonged axis in Gramineæ is outside the paleæ, in *Carex* inside the perigynium. Indeed, it is probable that Gramineæ and Cyperaceæ are much less closely related than is generally supposed, and may be regarded as reductions of very different types of Endogens. A stronger confirmation is taken from two South African species of *Schoenoxiphium* (not generically distinct from *Carex*) in which the seta occasionally bears a spike of male flowers. This spike appears to be sterile, and may be a case of proliferation, but requires further investigation. If it be a normal spike, we must conclude the perigynium or subtending glume to be formed of one scale; for two opposite scales at the base of an alternate inflorescence is a derangement of the ordinary course of change from the alternative vegetative organs to the opposite or whorled floral organs, which is believed to have no example at least in Monocotyledons. If the perigynium is formed of two scales they must belong to the floral whorls. They are not subtending bracts analogous to the two free bracts of *Diplacrum*, or the united ones of *Hoppia*, for in both those cases the female flowers are terminal without any other subtending glume, and in *Carex* the female flower is lateral, and the perigynium is within one outer subtending glume. That they are two out of three parts of a real perianth is rendered improbable by their great development in one sex in an order where it is in all other genera suppressed or rudimentary, and without any trace of it in the other sex. The only remaining supposition is that the perigynium and seta represent the stamens of the male flowers, and are therefore in fact staminodia. The position with relation to the axis and subtending glume is the same, and although they are very different in form and texture, that difference is much diminished in *Uncinia longifolia*, where the dilated filaments of the males assume the aspect nearly of the perigynium of the females. The lobes of the perigynium in *Carex subulata*, and occasionally in some *Unciniæ*, have the look of the seta of *Uncinia*, and in one instance that seta bore a perfect anther. Brown confirmed his view of the perianth-nature of the perigynium by a specimen of *Carex acuta* with stamens within the perigynium. This is figured in Boott's plate 551, and an examination of beautiful specimens gathered by Mr. Spruce in Yorkshire shows, from the position and structure of the stamen-bearing perigynia, that they are altered female flowers in which more or less imperfect stamens replace the carpellary leaves of which the pistil is formed. If this homology of the perigynium with the androecium of the male flower is thought plausible, it is still doubtful, and the doubt can only be solved by a careful repetition of Payer's observations, and a repeated study of the anomalies of *Schoenoxiphium*, and of those species of *Carex* in which the seta is variously developed, many of the forms delineated in the late Dr. Boott's splendid illustrations of the genus requiring a special study of the specimens themselves, and it is hoped that botanists used to microscopical investigation will turn their attention to these disputed points by an examination of the parts in their earliest stages.—Dr. Hooker exhibited a case of *Araucaria Bidwilli*, one of fourteen produced on a tree in the Temperate House at Kew.*

* A reduced figure of this cone is given in the "Gardeners' Chronicle" for March 15th.

Botanical News.

ARTICLES IN JOURNALS.

Annales des Sc. Nat. (ser. 5, tom. xvi., November, 1872).—S. Sirodot, "Researches in the Freshwater Algæ of the Family *Lemanea-ceæ*," (pl. i.—viii.).—P. van Tieghem, "Memoir on the Secretory Canals of Plants."—A. Brongniart, "Report on M. Grand'Eury's Memoir, 'Flore Carbonifère du Dept. de la Loire.'"—P. van Tieghem, "On the Different Modes of Nervation of the Ovule and the Seed" (pl. ix.—xii.).—E. Janczewski, "The Parasitism of *Nostoc lichenoides*"* (pl. xiii.).—M. Woronine, "Researches in the Gonidia of *Parmelia pulverulenta*" (pl. xiv.).—P. Duchartre, "Observations on the Bulbs of Lilies" (pl. xv.—xvii.).—P. van Tieghem, "Remarks on a Memoir of Dutrochet's 'Sur la Volubilité des Tiges.'"—Triana and Planchon, "Prodromus Floræ Novæ Granatensis" (contd.) (*Coriariæ, Sabiaceæ, Connaraceæ, Staphyleaceæ, Celastrineæ, Hippocrateæ, Ilicineæ, Rhamneæ*).

Bull. de la Soc. Bot. France (tom. xix., pt. 1).—A. Brongniart, "On *Psaronius brasiliensis*."—Germain de St. Pierre, "On the Nature of Roots and Rhizomes."—E. Boreau, "Classification of *Bignoniaceæ* by the Structure of their Stems."—A. Rivière, "Tropical *Bromeliaceæ* and *Orchideæ*. Hybridisation of two *Lælias* from Brazil."—A. Chatin, "On the Truffle and its Naturalisation."—E. Roze, "On the Influence of the Study of the *Myxomycetes* on the Progress of Vegetable Physiology."—A. Méhu, "Obituary Notice of Jules Fourreau."—H. A. Weddell, "On the *Podostemaceæ*, especially their Geographical Distribution."—D. Clos, "Questions about Brazilian Plants."—C. Fermond, "On Double Flowers."—M. Cornu, "Affinities of *Myxomycetes* and *Chytridineæ*."—E. Cosson, "Descriptio plantarum novarum in itinere Cyrenaico a cl. Rohlfis detectarum" (*Viola scorpiuroides*, n.s., *Astragalus cyrenaicus*, n.s., *Anthemis cyrenaica*, n.s., *Festuca (Scleropoa) Rohlfisiana*, n.s.).

(Tom. xix., pt. 2.)—D. Clos, "Some Researches in Synonymy."—A. Viaud Grand-Maraîs, "Vendean Plant-names, and Use of Burdock for Viper-bites."—E. Roze, "On the Fertilisation of the Higher Cryptogams, especially *Sphagnum*" (pl. i.).—G. Planchon, "On Striate *Ipecacuanhas*."—J. de Seynes, "Physiological Experiments on *Penicillium glaucum*" (pl. ii. and iii.).—Ph. van Tieghem, "On the Oleo-Resinous canals of *Umbelliferæ* and *Araliaceæ*."—A. Chatin, "On the Culture of Morels."—H. Bonnet, "On a New Species of Truffle (*Tuber piperatum Buolici*)."—L. Brisout de Bamerille, "Additions to Catalogue of Plants of St. Germain-en-Laye."—V. Payot, "Note on *Woodsia ilvensis*."—A. Le Grand, "Popular Plant-names of Forez."—E. Boudier, "On a Remarkable Anomaly in *Agaricus maculatus*" (pl. iv.).—M. Cornu, "On the Zygosporos of *Mucor fusiger*, Lk.—A. Brongniart and A. Gris, "Revision of the *Cunonias* of New Caledonia" (*C. Lenormandi*, n.s., Balansa, n. 207; *C. Balansæ*, n.s., Bal., n. 2305, 1084; *C. bullata*, n.s., Bal., n. 612, 2304).—E. Prillieux, "Action of Blue Light on the Formation of Starch."—Ibid., "Blue

* See Bot. Zeitung 1872, 73.

Colouration of the Flowers of some Orchids under the Influence of Frost."—C. Royer, "Remarks on the Underground Organs of Lilies."

Botanisk Tidsskrift (1872, parts 1 and 2).—G. Lund, "The Calyx of Compositæ, an Essay on Unity of Development in the Vegetable World" (with a French translation).

FEBRUARY.

Grevillea.—M. C. Cooke, "British Fungi" (contd.).—W. A. Leighton, "Notes on Hellbom's Lichens of Lule Lapmark."—E. Fries, "Critical Notes on W. G. Smith's Mycological Illustrations, part 2."

Hedwigia.—Venturi, "On *Orthotrichum*" (contd.).—J. Juratzka, "Bryological Notes."

Botaniska Notiser.—T. M. Fries, "On the Flora of Nova Zembla."—P. Olsson, "On the Flora of Jämtland."—Swedish Botanical literature in 1871.

Flora.—H. de Vries, "Report on the Principal Publications on Botany in Holland in 1872."—H. Wawra, "Notes on the Flora of the Hawaii Islands" (contd.) (*Lipochæta Lahainæ*, n.s.).—W. Nylander, "Observata lichenologica in Pyrenæis orientalibus."—W. Velten, "Movements and Structure of Protoplasm."—O. Böckeler, "Two New Genera of *Cyperaceæ* (*Sphæropus*, *S. pygmæa*, New Holland; *Lasiolepis*, *L. brevifolia*, India; *L. pilosa* and *L. aquatica*, French Guiana).

Botanische Zeitung.—J. Baranetzky, "On the Periodicity of Bleeding in Plants, and its Causes."—E. Strasburger, "Remarks on *Lyceopodiaceæ*."—Köhne, "On the Genus *Cuphea*."—H. Hoffmann, "On a Remarkable Variation."

Oesterr. Bot. Zeitschrift.—J. Wiesner, "On Plants noticed in the Present Winter."—W. C. Focke, "On the Formation of Species in Plants."—A. Kerner, "Distribution of Hungarian Plants" (contd.).—H. Wawra, "Sketches of the Voyage of the *Donau*" (contd.).—R. von Uechtritz, "Notes on Knapp's Pfl. Galiziens" (contd.).

Nuovo Giorn. Bot. Italiano.—N. Terracciano, "Enumeratio plantarum vasc. in agro Murensi sponte nasc."—A. Mori, "Review of Botanical Communications to the Congress of Italian Naturalists."

New Books.—W. B. Hemsley, "Handbook of Hardy Trees, Shrubs, and Herbaceous Plants" (Longmans, £1 1s.).—C. P. Hobkirk, "A Synopsis of the British Mosses" (Reeve and Co., 7s. 6d.).—C. Koch, "Dendrologie," vol. ii. Monopetalæ and Apetalæ, except *Cupuliferæ* (Erlangen).—W. P. Hiern, "A Monograph of *Ebenaceæ* (Trans. Camb. Philosophical Soc., vol. xii.)

The new parts of Baillon's Monographies contain the orders Bixaceæ, Cistaceæ, Violaceæ, Tiliaceæ, Dipterocarpeæ, Chlænaceæ, and Ternströmiaceæ.

In the last volume (xxvi.) of the Transactions of the Royal Society of Edinburgh, Prof. Balfour has published an account, illustrated by two plates, of the Ipecacuan plant (*Cephaelis Ipecacuanha*, A. Rich.), which has been cultivated in the Botanic Garden for upwards of forty years. All the characters, including the microscopic structure of the stem and root, are well figured.

In a paper read before the Royal Society on February 27th, and

printed in abstract in No. 142 of its "Proceedings," Dr. H. Airy discusses the meaning of Phyllotaxis, or leaf-arrangement. Assuming that all have been derived from one ancestral leaf-order, the author considers the distinctions ($\frac{1}{2}$) as nearest to the original, and shows by experiment how this arrangement will, under different degrees of contraction, with twist, assume successively all the various spiral orders that exist, $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{8}$, $\frac{5}{13}$, &c. He points out that the period at which phyllotaxy is most perfect is when the leaves are yet in the bud, the object or use being economy of space and avoidance of injury.

We have received an important contribution to European Mycology in the first part of "Icones Selectæ Hymenomycetum Hungariæ," published by the Hungarian Academy of Sciences. The author of the text is C. Kalchbrenner, of Wallendorf, and the figures are chiefly by S. Schultzes, of Müggeburg, who has devoted many years to the investigation of the Fungi of Southern Hungary and Slavonia, and has made a large collection of drawings and descriptions. Only new or little-known species are admitted into the work; the descriptions are in Hungarian and Latin, in parallel columns, and the general form of the book that of Fries' "Icones sel. Hymenom. Sueciæ," to which it will form a companion volume or continuation. Eastern Europe may well be expected to yield a rich harvest of new forms; the following are the species described, all of which are figured in the ten excellent plates printed in colours which accompany the text:—*Agaricus* (*Amanita*) *aureola*, Kalchbr., *A. (Am.) cygnea*, Schultzes, *A. (Lepiota) nympharum*, K., *A. (Lep.) Schultzeri*, K., *A. (Tricholoma) macrocephalus*, S., *A. (Trich.) psammopus*, K., *A. (Trich.) argyreus*, K., *A. (Trich.) Centurio*, K., *A. (Trich.) tumulosus*, K., *A. (Clitocybe) trullæformis*, Fr., *A. (Collybia) atramentosus*, K., *A. (Coll.) plumipes*, K., *A. (Coll.) rancidus*, Fr., *A. (Mycena) cæsiellus*, K., *A. (Omphalia) reclinus*, Fr., *A. (Omph.) cyanophyllus*, Fr., *A. (Pleurotus) sapidus*, S., *A. (Pleur.) pardalis*, S., *A. (Pleur.) superbis*, S., *A. (Annularia*) Fenzlii*, S., and *A. (Pluteus) patricius*, S. The price of the part, which is published at Pesth, is 6 fl. austr. (=12s.) It is hoped that a second part will appear before the end of the year.

The instructive address of Prof. Asa Gray, delivered last August at the American Association, and of which we extracted the most valuable portion (vol. x., p. 309), has been printed in a separate form, with the addition of an appendix, in which the temperate extra-European plants of the Atlantic United States are ranged in a parallel column with those identical or strictly representative species which occur (1) in the Pacific United States (Oregon or California), and (2) in North-Eastern Asia (Japan to the Altai and Himalayan mountains). By this means the special relations of the floras of Eastern North America and Eastern Temperate Asia are presented in one view, whilst we see also that only a third of the species or forms more or less peculiar to those regions are represented in Oregon and California. A second table gives those non-European plants of Temperate Eastern Asia (only 45 in number) represented identically or by some near relative in Oregon or California, but not in the Atlantic United States. A list is also given of the principal plants peculiar to the United States and Europe, which we intend to print in another page.

* Equals the subgenus *Chamaeota*, W. G. Smith in Journ. Bot. 1870, p. 213.

Three centuries of the new series of the "Herbarium normale," now edited by F. Schultz and F. Winter, have just appeared, two of Phanerogams and one of Cryptogams. They contain a very good set of species, chiefly from France and Germany, but also from Denmark, Hungary, the Pyrenees, &c. We notice a Batrachian *Ranunculus*, sent under the name of *B. confusum*, named *B. Langei*, from Copenhagen, and very close to that plant. *Senecio divergens*, F. Schultz, another new name, seems not worth distinction from *P. aquaticus*. Several interesting *Hieracia* are given, including *H. Fritzei*, which was described in the "Flora" last year by F. Schultz. There are also some good Carices of the *muricata* section—*C. contigua*, Hoppe, *C. Leersii*, F. Schultz; and *Psamma baltica*, from the Island of Bornholm. Accompanying the plants is an instalment of the "Archives de la Flore d'Europe," with a list of species, and notes on the rarities and novelties. The price is 25fr. per century. Address: "Dr. F. Schultz, à Weissenburg, Alsace." Dr. Schultz is also desirous of securing promises of subscription (3fr.) to a complete catalogue of the twelve published centuries of his own "Herbarium normale," with notes on many of the species.

From Prof. Balfour's Report of the Royal Botanic Garden of Edinburgh for the year 1872, we learn that the Botanical Society has handed over to the Garden its entire library. A room has been provided for the reception of the books, which include many valuable publications. We are also informed that a guide to the Garden and plan of its arrangement have been prepared and are now in the press. The Herbarium is still in need of a salaried curator who could devote his time to it.

Richard Deakin, M.D., died at Tunbridge Wells on Feb. 18th. He was formerly in practice near Sheffield, and printed there his chief work, the "Florigraphia Britannica," which came out in numbers during the years 1837—1848, and forms four volumes. This contained figures of all the species, drawn by the author, and was the first cheap illustrated British Flora. He afterwards settled at Torquay, and paid some attention to Lichens, describing some new species of *Verrucaria* and *Sagedia* in the "Annals of Natural History" for 1854. His professional duties took him frequently to the Mediterranean, and he spent some years at Rome. His "Flora of the Colosseum," published in 1855, enumerates no less than 420 species as growing among the vast ruins of the Flavian Amphitheatre. In later life Dr. Deakin lived at Tunbridge Wells, and published a Flora of that neighbourhood in 1871, which was noticed in our volume for that year (p. 251).

The Herbarium of Mosses of the late W. Wilson has been purchased, along with the whole of his original drawings and MSS., for the Botanical Department of the British Museum. The collection is very extensive, consisting, first, of a very extensive series of Mosses from all parts of the world, nearly every species being accompanied by copious critical notes and drawings; and, secondly, of a very large British collection, containing, it is believed, the type series of the "Bryologia Britannica"; the whole illustrated by innumerable notes, descriptions, and microscopical preparations and drawings—the work of a life-time devoted to Muscology.

Original Articles.

ON RUMEX OBTUSIFOLIUS.

BY HENRY TRIMEN, M.B., F.L.S.

(TAB. 131.)

THOUGH few native plants are more familiar than the broad-leaved Dock, ubiquitous throughout the country and common enough in waste ground and gardens in London itself, yet from its very frequency it is liable to be constantly passed by without examination. It is, therefore, with the object of calling attention to its characters and their modifications that I have put together these notes as an accompaniment to Mr. Blair's excellent drawing.

R. obtusifolius was very well known to the ante-Linnæan botanists, and in this country described by Johnson, Parkinson, Ray, Morison, and Buddle. Morison indeed distinguished the two varieties to be presently noticed in his Hist. Oxon. (ii., p. 580), and I believe is the only English author who has done so. All the botanical writers in this country since the establishment of the Linnean system have described only the usual form of *R. obtusifolius* under that name.

In 1822, in his "Schedulæ criticæ" (p. 161), Wallroth separated from *R. obtusifolius* a second species under the name of *R. sylvestris*. Shortly after, Fries in his "Novitiæ" (ed. 2, p. 98) gave reasons for believing this *R. sylvestris* to be the plant intended by Linnæus under his *R. obtusifolius*, whilst Wallroth's *R. obtusifolius* was referred by Fries to *R. divaricatus*, L. In this latter determination he has not been followed by Meissner, nor by Grenier and Godron, who in their "Flore de France" have considered, with greater probability, Linnæus' *R. divaricatus* to be a variety of *R. pulcher*, whilst they have named Fries' *R. divaricatus*, *R. Friesii*. Nyman has called the same plant *R. Wallrothii*.*

In some of the more recent British Floras (Babington's, Boswell-Syme's) attention has been called to this continental *R. sylvestris* as a plant to be looked for in this country. It was, therefore, with great satisfaction that I was able to identify with Wallroth's species a plant collected on the Thames bank by Mr. Warren, as stated in Journ. Bot. 1872, pp. 308, 332. By the liberality of the same successful investigator of obscure plants I am now enabled to give a figure of his discovery.

From an examination of several of Mr. Warren's well-selected specimens I have drawn up a full description of the plant. As, however, most of its characters are those of the usual English *R. obtusifolius* (*R. Friesii*, Gr. & Godr.), it will be sufficient here to call attention to those by which it differs from that plant. These are

* In Journ. Bot. 1872, p. 308, this name was inadvertently referred to *R. sylvestris* instead of to *R. Friesii*.

chiefly found in the inner perianth-leaves, which when the fruit is *fully ripe* present the following contrasted characters in the two plants respectively :—

R. Friesii, Gr. & Godr.

Fully ripe inner perianth leaves broadly ovate-deltoid, $\frac{1}{5}$ to $\frac{1}{4}$ inch long, $\frac{1}{5}$ to $\frac{5}{8}$ or more broad, the upper one rather the longest, with 3 (sometimes 4) sharp subulate spreading teeth on either side varying in length from $\frac{1}{2}$ or less to (rarely) as wide as the perianth-leaf, the two lower with their midribs thickened but scarcely calliferous, the upper bearing a rather small callus rarely half as long as the perianth-leaf.

Nut about $\frac{1}{10}$ inch long by scarcely $\frac{1}{8}$ broad.

R. sylvestris, Wallr.

Fully ripe inner perianth-leaves oblong- or oval- triangular, $\frac{1}{8}$ to $\frac{3}{8}$ inch long, $\frac{1}{8}$ broad, equal in length, margins entire or with one or two unsymmetrical points or teeth, all three calliferous, the upper callus very large, some times almost covering the perianth-leaf.

Nut $\frac{1}{2}$ inch long by $\frac{1}{8}$ broad.

I have not been able to trace any satisfactory differences in the form of the root-leaves. The figure in Hayne's work represents the apex of the leaf of *R. Friesii* as acute, but this is certainly not always the case. It is often quite as rounded at the top as in Sturm's and Reichenbach's figures; perhaps, however, the general outline is more ovate and gradually tapering in this plant than in *R. sylvestris*, where the general form is ovate- or oval-oblong, and somewhat suddenly contracted into the blunt or subacute apex.

In habit there is an appreciable difference between the plants, but it is not very easily conveyed by description. *R. sylvestris* suggests *R. conglomeratus* in consequence of the more erect branches (which ascend at a somewhat less angle with the stem than in *R. Friesii*) and the entire or nearly entire perianth-leaves; but the absence of leaves to the whorls is in great contrast. The stem appears to be also more nearly glabrous than in *R. Friesii*, which is usually clothed with very short white papillose hairs. The stem-leaves and inflorescence present no difference; in both forms the pedicels are much longer than the perianth, and have a true articulation below the middle; further examination of a larger series of specimens than I have at present before me is required to determine whether, as I am inclined to think, this articulation is not lower down on the stalk in *R. sylvestris* than in *R. Friesii*.

On consideration of these characters it appears to me that they are not such as constitute specific difference, and I therefore follow F. Areschoug and Koch in combining both forms under one species. Indeed the differences are not constant, and intermediates frequently occur. The plant from the South of Sweden, distributed by Ahlberg Lund last year, makes an approach in its perianth-leaves to *R. Friesii*, and I have seen a quite similar intermediate from Essex.

With regard to the name, there can be little objection to including both under *R. obtusifolius*, L., as, though it is possible that Linnæus

may have mainly had *R. sylvestris* in his view, it seems nearly certain from his synonyms and localities that he also included *R. Friesii*, and indeed M. Grenier has in his last work ("Flore de la Chaîne Jurassique") abandoned that name for *R. obtusifolius*, L.

The synonymy of the forms is as follows:—

Rumex obtusifolius, L. Sp. lant. ed. 1., p. 335.

Var. *α. Friesii*.

R. obtusifolius, Wallr. Sched. crit. i., p. 168, Meissner in DC. Prod. xiv., p. 53, et auct. plur.

R. divaricatus, Fries, Mant. iii., p. 25, and Summa Veg. Scand., p. 202 (non L.)

R. Wallrothii, Nyman, Syll. Fl. Europ., p. 327 (1854-55).

R. Friesii, Gren. & Godr., Fl. France iii., p. 36 (1855-56).

Icon.—Lobel Ic. 285, reprod. Parkinson Theat. Bot., p. 1225, and Petiver Herb. Brit. Cat., t. ii., f. 9. (very rough), Curt. Fl. Lond., fasc. 3 (bad), Eng. Bot., t. 1999, reprod. Syme E.B. mccc. (very poor), Fl. Danica, t. 1335 (very poor), Sturm, Deutschl. Flora, bd. 17, hft. 73, n. 9. (good), Reichenb. Ic. crit. iv., f. 550 (poor), Hayne Darst. & Beschr. Arzneig., bd. xiii., tab. 1, 1st figure (good).—Details—Leighton, Fl. Shropshire, p. 153, F. Areschoug ofv. K. vet. akad. Forhandl. 1862, t. iii, f. 1.

Exsicc.—Fries, Herb. norm., fasc. vii., n. 57.

Var. *β. sylvestris*.

Lapathum sylvest. fol. subrotundo seminis involucro lævi seu plano, Morison, Hist. Oxon. ii., p. 580 (1680).

R. sylvestris, Wallr. l.c., p. 161, Ratzeburg in Hayne l.c., bd. xiii., p. 1, Meissner l.c., p. 50.

R. obtusifolius, Fries, Mant. iii., p. 25.

R. obtusifolius, var. *γ.*, Koch, Fl. Germ. & Helv., ed. 2, p. 706, and in Sturm l.c..

R. obtusifolius, var. *microcarpa*, Crépin, Man. Fl. Belg., ed. 2, p. 248.

R. acutus, Tausch pl. select., fide Koch (non L.)

Icon.—Sturm l.c., bd. 17, hft. 73, n. 11 (very good), Hayne l.c., 2nd figure (good).

Exsicc.—Reichenb. Exs., n. 18!, Fries, Herb. norm., fasc. v., n. 54, Meinshausen, Herb. Fl. Ingr., n. 529?

It has been stated by several authors that *R. sylvestris* is a plant of Northern Europe, and *R. Friesii* of the South. It would be perhaps more correct to say that the two varieties have Eastern and Western proclivities respectively in Europe, but neither are these very strongly marked. *R. sylvestris* does not seem to have been noticed in France, and has as yet been found in England only in Mr. Warren's locality, by the side of the Thames between Putney and Hammersmith Bridges, Surrey, where he saw about 100 plants, extending over about half a mile, and frequently intermixed with *R. Friesii*. The locality is not beyond a suspicion of introduction, but it is probable that attention being directed to the plant it will be detected in other places, though likely to be a scarce plant in this country. From abroad there are specimens of *R. sylvestris* in the herbarium of the British Museum from Thuringia, *Wallroth*; Denmark, *Trimmen*;

Dorpat, *Gruner*; Hanau, *Clemençon*; St. Petersburg, *Meinshausen* (doubtful); Sweden, *Ahlberg* (approaches *R. Friesii*). It has been recorded also on sufficient authority from Berlin, Bohemia, and Volhynia, and Tenore gives Naples as a locality. *R. Friesii* is common throughout the British Islands, and I have seen typical specimens from France, Switzerland, Belgium, Prussia, Sweden, Spain, and the Tyrol.

The Lapathoid Docks being frequently in descriptive works—as Meissner's monograph and Hooker's and Bentham's British Floras—divided into primary groups on the character of toothed or untoothed inner perianth-leaves, the two plants here considered varieties of one species would awkwardly fall under different sections, and it is thus perhaps from necessity that Meissner has been forced to keep them as separate species. It would require a profound study of this most difficult genus before anyone would be justified in pronouncing on the value of the toothing as a character; but so far as the plants now under notice are concerned, one can readily find a complete gradation in this respect, whilst even from one plant of *R. sylvestris* there may be taken ripe perianth-leaves quite entire or more or less furnished with irregular teeth of various lengths. It is possible that, as Meissner has suggested, *R. sylvestris* may be a hybrid between *R. Friesii* and *R. conglomeratus*; but there are difficulties in conceiving that such crossing would produce our plant, and equally in suggesting any more probable parentage. The whole question of the alleged frequent hybrids in this genus urgently needs a careful examination, with experimental culture, without which we can scarcely hope to come to any satisfactory arrangement of the numerous puzzling forms it contains.

DESCRIPTION OF TAB. 131.—*Rumex sylvestris*, Wallr.; root-leaf and portion of stem and flowering branches from specimens collected by the Thames in Surrey, by the Hon. J. L. Warren in 1872. Fig. 1. Outer perianth segments; 2. Inner perianth segment; 3. Enlarged perianth with fully ripe fruit; 4. Nut; 5. Outline of one face of nut. (2a, 3a, 4a, 5a. The same parts of *R. Friesii*, Gr. & Godr.) All the details $\times 4$ diam.

ADDITIONS TO THE BRITISH LICHEN-FLORA.

BY THE REV. J. M. CROMBIE, F.L.S. AND G.S.

No. III.

THE publication of Leighton's British Lichen-Flora has necessarily interrupted the continuity of these papers. Taking it therefore as a fresh starting-point, there now fall to be enumerated the following species and varieties as additions to the list of our British Lichens. Several of them, as usual, are *new species*, and others from their rarity are very interesting:—

1. *Collema stygium* (Del.), Schær. Spic., p. 544. On stones of wall, near High Force Inn, Teesdale, Durham (Mudd), *fide* Arnold in Flora, 1867; also on calcareous rocks near Kendal, Westmoreland (Martindale).

2. *C. polycarpon* (Schær.), Kphb. Gesc. Lich. ii., p. 577. On calcareous rocks, Appin, Argyleshire (Crombie), very sparingly, but no doubt to be detected elsewhere.

3. *C. Laureri* (Fw.), Krb. S. L. G., p. 414. On stones of wall, near High Force Inn, Teesdale (Mudd), *vide* Arnold in Flora, 1867; *vid.* Mudd Man., p. 44, t. i., f. 6, *s.n.* *Synechoblastus complicatus* (Schl.).

4. *C. auriculatum*, var. *pinguescens*, Nyl. in Flora, 1872, p. 353, "thallus thicker, lobes more incised" than in the type. On shady walls, Finlarig, Killin, and calcareous rocks, Craig Tulloch, Blair Athole (Crombie), gathered only very sparingly.

5. *Obryzum dolichoteron*, Nyl. in Flora, 1872, p. 353, *sp. n.* Parasitic on the above var. of *C. auriculatum*, Hffm., on Craig Tulloch (Crombie), and apparently very rare.

6. *Leptogium amphineum* (Ach.), Nyl. Scand., p. 32. On the ground near Penzance, Cornwall (Curnow), but sparingly; probably to be met with elsewhere.

7. *Calicium byssaceum*, Frs. L. Ref., p. 399. On dead twigs of Alders by the banks of the Garry, Blair Athole (Crombie); probably not uncommon, though only a single specimen was gathered, and that accidentally.

8. *Alectoria divergens* (Ach.), Nyl. Scand., p. 71. On the ground amongst Mosses on the summit of Cairngorm, in Braemar, very rare (Crombie, 1872); a much smaller state than in specimens from Scandinavia, and at first sight more resembling *Cetraria aculeata*.

9. *Ramalina intermedia* (Del.), Nyl. in Flora, 1873, p. 66. On heaths, in Annet Island, Scilly, well fruited (Curnow, 1872); not unlike some states of *R. farinacea*, but quite distinct.

10. *Parmelia proluxa* * *Delisei* (Dub.), Nyl. On rocks, Kymyal Cliff, near Penzance (Curnow). Thallus K (Ca Cl.). $\mp$ From the same locality there appear also isidiiferous and panniform conditions.

11. *Pannaria nigra* * *psotina* (Ach.), Nyl. Scand., p. 126. On calcareous stones of parapet of bridge over the Tay at Hexham, Northumberland (Crombie, 1872).

12. *Lecanora diphyodes*, Nyl. in Flora, 1872, p. 353. On granitic maritime rocks near Portlethen, on the coast of Kincardineshire, very rare (Crombie, 1872).

13. *L. lutescens*, DC. Fl. Fr. ii., p. 668. On old larch pales at Durris, near Aberdeen (Crombie); abundant, but rarely with apothecia; no doubt to be detected elsewhere.

14. *L. piniperda*, Krb. Par., p. 81. On decaying larch rails, very sparingly, near Loch Tummel, Perthshire (Crombie), and like the preceding rarely with apothecia.

15. *L. symmiactera*, Nyl. in Flora, 1872, p. 249. On old pales near Mill Hill, Middlesex (Crombie), and probably common throughout Great Britain.

16. *L. sarcopis* * *homopis*, Nyl. in Flora, 1872, p. 251. On old pales near Finchley, Middlesex (Crombie), but with spores rarely well developed.

17. *L. subintricata*, Nyl. in Flora, 1868, p. 478, Th. Frs. Lich. Scand., p. 265. On old pales at Killin and Blair Athole (Crombie), not typical but *f. obscurior*, Nyl. in litt.

18. *L. varia* * *leptacina* (Smmrft.), Th. Frs. Scand., p. 260. Amongst Mosses on boulders, sparingly, on the summits of Ben Lawers and Ben-naboord, = *L. varia*, f. *terrestris*, Cromb. Enum., p. 52.

19. *L. præpostera*, Nyl. in Flora, 1873, p. 19. *sp.n.* On basaltic rocks near the sea in the island of Jersey (Larbalestier); similar to *L. atrynea*, but distinguished by the reactions.

20. *L. coniopta*, Nyl. l.c., *sp.n.* On gneissic boulders near Portlethen, on the Kincardineshire coast (Crombie, 1872), and on granite rocks near Penzance (Curnow).

21. *L. leucophaea*, var. *conglobata*, Flot. in Flora, 1828, p. 564. On quartzose boulders on the summit of Ben-y-gloe, Blair Athole, very sparingly (Crombie).

22. *L. alpina*, Smmrft. Suppl., p. 91. On rocks in maritime and subalpine localities—Noirmont, Jersey (Larbalestier), Cader Idris, South Wales (Leighton), *fide*. Leight. in Grevillea i., p. 125.

23. *L. peliscypha* (Whlbn.), Nyl. in Flora, 1872, p. 364. On stones of walls and boulders, abundant on the coast of Kincardineshire (Crombie), and probably not unfrequent in maritime and sub-alpine tracts.

24. *L. glacocarpa*, var. *depauperata*, Kphlb. On calcareous boulders on Craig Tulloch, Blair Athole. Under this var. I include f. *conspersa* (Frs.), Th. Frs. Scand., p. 212, and f. *conferta*, Cromb. Mss. both very sparingly in the above locality; also f. *cinereo-pruinosa*, Anzi, which occurs on Craig Guie, Braemar.

25. *Lecidea misella*, Nyl. Lapp. Or., p. 177, = *L. melanochoza*, Leight. Lich. Fl., p. 267. On old fir pales, near Loch Tummel, Perthshire (Crombie), apparently very rare.

26. *L. metamorphea*, Nyl. Prod., p. 113. On stones of a wall in Glen Fender, Blair Athole (Crombie), but very sparingly gathered. With K., the spores are distinctly 3-septate.

27. *L. turgidula*, var. *pityophila*, Smmrft. Lapp., p. 154. On old fir pales in Blair Athole and Killin (Crombie); probably not uncommon in the Scotch Highlands. From this *L. endopella*, Leight. Lich. Fl., differs chiefly in the hymeneal gelatine being of a beautiful blue colour with iodine.

28. *L. leucophaeopsis*, Nyl. in Flora, 1873, p. 20, *sp.n.* On quartzose boulders and stones of walls on Ben Lawers (Crombie), plentiful, but rare in fruit.

29. *L. squalida*, Ach. L. U., p. 169. On the ground amongst calcareous boulders on Craig Guie, Braemar (Crombie), sparingly gathered.

30. *L. asema*, Nyl. in Flora, 1872, p. 356, *sp.n.* On sandstone rocks, on the coast of Jersey (Larbalestier), rare; approaching *L. latypodes*, Nyl. = *L. sublatypea*, Leight. (*nomen informe*).

31. *L. alpestris*, Smmrft. Lapp., p. 156. On the ground here and there on the ascent of Ben Lawers, but sparingly (Crombie); not to be confounded with *L. montana*, Nyl.

32. *L. confusula*, Nyl. in Flora, 1872, p. 390, *sp.n.* On micaceous stones of an old wall on Craig Tulloch, Blair Athole (Crombie), very rare.

33. *L. mesotropoides*, Nyl. in Flora, 1872, p. 359, *sp.n.* On calcareous boulders of Craig Tulloch, Blair Athole (Crombie), but only a single specimen gathered.

34. *L. mesotropiza*, Nyl. in Flora, 1873, p. 20, *sp.n.* On micaceous stones of an old wall, on the hill of Ardo, near Aberdeen, (Crombie), but very sparingly.
35. *L. deparcula*, Nyl. in Flora, 1872, p. 361, *sp.n.* On calcareous stones amongst detritus on the summit of Ben-y-gloe, Blair Athole (Crombie), extremely rare.
36. *L. subfurva*, Nyl. in Flora, 1872, p. 360, *sp.n.* On schistose stones of old walls in Glen Fender, and on Craig Tulloch, Blair Athole (Crombie), frequent, but often sterile.
37. *L. atrobadia*, Nyl. in Flora, 1872, p. 361, *sp.n.* On quartzose boulders on the summit of Ben-y-gloe, Blair Athole (Crombie), very sparingly.
38. *L. ænea* (Duf.), Frs. L. E., p. 108. On quartzose boulders near the summit of Morrone, Braemar (Crombie), very sparingly seen.
39. *L. lavata* (Ach.), Nyl. Scand., p. 234. On rocks and boulders, Ben Nevis, Lochaber (Crombie); a distinct species according to Nyl. in litt. from *L. petræa*, and probably not uncommon in Britain: *f. ferrata*, Nyl. l.c.; on rocks by streams on Ben Lawers (Crombie).
40. *L. occulta*, Flot. (Zw. Exs. 135),—(*Bacidia occulta*, Krb. Par., p. 186). On rocks, Diganwy, near Conway, and about Bettws-y-Coed, Wales, Leight. in Grevillea i., p. 58. According to Nyl. in litt. *L. occulta*, Flot.=*L. leuoclinella*, Nyl., Leight. Lich. Fl., p. 310; *vid.* also Arn. Lich. Frag. xv., p. 4.
41. *Xylographa parallela*, var. *pallens*, Nyl. Scand., p. 250. On old pales at Pass of Killiecrankie, Blair Athole, along with *f. elliptica*, Nyl. in litt. (Crombie), very sparingly.
42. *Opegrapha hapaleoides*, Nyl. in Flora, 1869, p. 296. On the trunks of trees at Clifton, Somersetshire (Larbalestier, 1869), *fide* Nyl.
43. *Arthonia proximella*, Nyl. Scand., p. 262. On the bark of Holly, in Gwydir Woods, North Wales, rare (Leighton), *vid.* Grevillea i., p. 60.
44. *A. aspersella*, Leight. in Grevillea i., p. 60, *sp.n.* On the bark of Holly, Gwydir Woods, North Wales (Leighton).
45. *Verrucaria analeptella*, Nyl. in Flora, 1872, p. 363. On the bark of trees, near Cork, Ireland (Carroll), frequent,=*Sagedia ænea*, Anzi L. min. r. no. 395.
46. *V. submicans*, Nyl. l.c., *sp.n.* On the bark of Hollies, near Lyndhurst, New Forest (Crombie), probably not unfrequent.
47. *V. spilobola*, Nyl. l.c., *sp.n.* On calcareous stones of Craig Tulloch, Blair Athole (Crombie), and apparently very rare.

DESCRIPTIONS OF THREE NEW SPECIES OF PORANA.

BY S. KURZ.

DURING a visit to the Sikkim-Himalaya in October, 1868, I found in the bushes that border the road from Kersiong to Senada a blue-flowered *Convolvulacea* which showed great resemblance to *Porana grandiflora*, Wall. A few days ago, on more carefully examining my specimens, I became aware of having to deal with a new and well-marked species. This inquiry naturally led me to examine also the remainder of the species of *Porana*, and in doing so I find two other undescribed species from British Barma, which I now take the opportunity of describing along with my new Sikkim species:—

1. *PORANA STENOLOBA*, *nov. sp.*—Herba (annua v. perennis?) volubilis, 6—10 pedalis, glabra; folia subcordato-ovata, petiolo $\frac{1}{2}$ — $1\frac{1}{2}$ pedali gracili, magnitudine valde variantia, majora vulgo 2—3 poll. longa, in acumen longissimum angustum lamina fere dimidio brevius obtusum mucronatum protracta, membranacea, glabra; flores speciosi, cyanei, pedicellis $\frac{1}{2}$ pollicaribus lævissimis suffulti, secus ramulos supra-axillares foliaceo-bracteatos racemosi v. in racemos flexuosos terminales graciles foliatis dispositi; bracteæ foliaceæ ovato-lanceolatae ad lineares longissime caudato-acuminatae; bracteolæ sub calyce 2, minutæ setaceæ; calyx glaber, segmentis linearibus inæqualibus 3—4 lin. longis; corolla tubuloso-infundibuliformis, poll. in diametro v. major, lobis brevissimis latis mucronato-apiculatis; capsulæ adhuc valde immaturæ glabræ, lobi calycini sub fructo inæquales, 3 longiores 1 — $1\frac{1}{2}$ pollicares, anguste lineares, 1—2 lin. lati, nervis basi 5, sursum 3 parallelis percursi, transverse venulosi, rigide chartacei, subnitidi, truncato-obtusi, mucronati; minores 2 dimidio fere breviores, conformes.

Hab.—Sikkim-Himalaya, not unfrequent along the post-road from Kersiong to Darjeeling at 5-6000 feet elevation, on metamorphic rocks. Fl. October.

2. *PORANA SPECTABILIS*, *nov. sp.*—Frutex volubilis, alte scandens ochraceo-tomentellus; folia majora 2—3 poll. longa, ovata, inferiora basi subsinuato-cordata, superiora minora basi rotundata v. obtusa, petiolo tomentello $\frac{1}{2}$ —1 pollicari suffulta, præsertim subtus ochraceo-tomentella, supra vix glabrescentia, obtusiuscula v. acuta, mucronata, crasse membranacea; flores speciosi, candidi, secus ramulos axillares v. terminales efoliatis v. sparse foliatis tomentosos racemosi; corolla tubuloso-infundibuliformis, c. poll. in diametro, extus puberula, tubo ampliusculo pollicari; pedicelli 2—3 lin. longi, fulvo-tomentosi; calyx tomentosus, segmentis valde inæqualibus linearibus obtusiusculis, longioribus 3 circ. 2 lin. longis, cæteris 2 dimidio brevioribus; capsula subglobosa, styloso-acuminata, parce adpresse sericea, pisi magnitudinis; lobi calycini sub fructu ad tres reducti, longissimi, c. $1\frac{1}{2}$ poll. longi, basi 5-sursum 3-nervii, transverse reticulati, præsertim subtus secus nervos hirtuli, obtusiusculi.

Hab.—Not unfrequent in the tropical evergreen forests of Martaban, *e.g.*, in the Toukyeghat Valley, east of Tongu.—Fl. March, April; Fr. April, May.

3. *PORANA TRUNCATA*, *nov. sp.*—Herba volubilis, annua?, subglabra; folia cordato-ovata, basi sinuato-cordata, majora 2—3 poll. longa, petiolo

1—2 pollicari suffulta, longe acuminata, membranacea, glabra v. subtus secus nervos subtiliter puberula; flores desunt; racemi dein paniculati, foliis floralibus cordato-ovatis sessilibus gaudentes; pedicelli sub fructu puberuli, graciles, 3—4 lin. longi; calycis fructigeri lobi omnes aucti, oblongi v. lineari-oblongi, basin versus nonnumquam attenuati, $\frac{1}{2}$ poll. longi, basi 5—7-sursum 3-nervii, obtusi cum mucrone, transverse venosi, rigide chartacei, subnitidi, capsula obturbinata v. subobconica pisi minoris magnitudinis, lævis, efflata et circa apicem apiculatum in cupulam concavo-depressam producta et quasi circulariter truncata.

Hab.—In cleared lands (toungyas) in and around evergreen tropical forests of the eastern slopes of the Pegu Yomah, *e.g.*, the headwaters of the Khaboungchoung; also Martaban (Rev. F. Mason) and the Kareni country (O'Riley).—Fr. January.

There is another species in the Calcutta Herbarium nearly allied to the above; but the specimens (Griff. No. 5876, from East Bengal) are very incomplete and destitute of flowers and leaves, and therefore quite unfit for description.

Five species of *Porana* are described in De Candolle's "Prodromus," to which Dr. F. v. Mueller added an Australian species, making now a total of nine species. The Indian ones may be arranged in the following way:—

* All the 5 calyx-segments in fruit equally enlarged and stellately spreading, several-nerved. Corolla small, 2—4 lin. across, white.

† Racemes or panicles furnished with cordate sessile floral leaves. Calyx hardly a line long.

1. *P. truncata*, Kurz. Capsules at apex depressed-concave, truncate. (Pegu, Martaban, and Karenee country.)

2. *P. racemosa*, Roxb. Capsules rounded with a mucro. (Whole Himalaya to Khasya and Martaban; also in Hindostan.)

†† Racemes panicled, without floral leaves.

3. *P. volubilis*, Burm. Leaves at base rounded or hardly cordate; calyx-lobes about 2 lin. long, broad and blunt, often purplish coloured. (From Khasya and Barma down to Malacca, the Indian Archipelago, and Philippines, also in Hindostan.)

** Only 3 of the calyx-lobes in fruit fairly enlarged, erect or erect patent, the remaining 2 wholly or partially reduced, or at least much smaller.

† Corolla small, about 1-2 lin. in diameter, white. Calyx-lobes in fruit 1-nerved.

4. *P. paniculata*, Roxb. All softer parts more or less tawny puberulous; racemes with floral leaves; calyx-lobes puberulous. (Base and lower parts of the Himalaya, especially in the terais; Behar and Rajmehal hills, Khasya and Sillhet to Ava, also Java.)

†† Corolla large and showy, the limb about an inch or more in diameter. Calyx-lobes in fruit several-nerved.

‡ Only 3 of the 5 calyx-lobes enlarged, pubescent, the others entirely suppressed. Flowers white.

5. *P. spectabilis*, Kurz. All parts shortly tawny-tomentose; calyx-lobes pubescent. (Martaban.)
- †† All the 5 calyx-lobes in fruit enlarged, but 2 of them much shorter, and usually much narrower, glabrous. Flowers steel-blue or purple.
6. *P. grandiflora*, Wall. Young shoots pubescent leaves deeply sinuate-cordate; racemes with minute bracts; fruiting calyx-lobes $\frac{1}{2}$ — $\frac{3}{4}$ inch broad, at base 11-nerved. (Sikkim and Nepal.)
7. *P. stenoloba*, Kurz. Quite glabrous; leaves slightly cordate; racemes with leafy very long-caudate bracts; calyx-lobes in fruit linear, 1—2 lin. broad, at base 5-nerved. (Sikkim-Himalaya.)

ADDITIONS TO THE FLORA OF BERKSHIRE.

BY JAMES BRITTEN, F.L.S.

THE following are the principal additions of species and localities to my "Contributions to a Flora of Berkshire," published in the "Transactions of the Newbury District Field Club" for 1871-2, and carrying the enumeration of Berkshire plants down to the end of 1871. I have since then looked through and extracted various localities from Samuel Rudge's herbarium, which includes a large number of British plants, and is now in the British Museum; and have received additional specimens and notes from the Rev. C. W. Penny, of Wellington College; Mr. F. Walker, of Abingdon; and Mr. A. Bennett, of Croydon. The species in the following list which were not included in my "Contributions" are:—*Camelina fœtida*, *Ulex Gallii*, *Vicia Bobartii*, *Enanthe Lachenalii*, *Valeriana sambucifolia*, *Doronicum plantagineum*, *Mentha rubra*, *Lemna polyrrhiza*, and *Juncus acutiflorus*.

I may mention that I have still a few separate copies of my "Contributions," which are at the service of any who may care to possess them.

The initials before the localities refer to the districts adopted in my catalogue:—

Anemone Pulsatilla, L. M. Moultsford Downs; A. Bennett.

Viola hirta, L. E. Wokingham; Rev. C. W. Penny!

V. canina, L. N. Frilford Heath; F. Walker!

Camelina fœtida, L. E. "Drawn from a specimen collected near Virginia Water"; E. Bot., ed. 3, i., 200.

Cardamine eu-hirsuta. M. On a wall between Pangbourne and Basildon; A. Bennett.

Arabis hirsuta, L. M. Sparingly on Streatley Down; A. Bennett.

Drosera rotundifolia, L. E. Bullmarsh Heath; Hb. Rudge!

Polygala calcarea, F. Sch. M. Moultsford Downs; A. Bennett.

Cerastium semidecandrum, L. E. Wokingham; Rev. C. W. Penny!

Hypericum Elodes, L. E. Bullmarsh Heath; Hb. Rudge!

Geranium phæum, L. E. Sonning; Hb. Rudge!

- Ulex Gallii*, Pl. E. Early Common; Hb. Rudge!
U. eu-nanus, Syme. E. Bullmarsh Heath; Hb. Rudge!
Trifolium medium, L. E. Sonning; Hb. Rudge!
T. arvense, L. E. Sonning; Hb. Rudge!
T. filiforme, L. E. Sonning; Hb. Rudge!
Astragalus glycyphyllos, L. E. Near Sonning; Hb. Rudge!
M. North Moreton; Miss King!
Vicia Bobartii, E. Forst. E. Sonning; Hb. Rudge!
Lathyrus palustris, L. "Woods, Berkshire"; Dickson, Hort. Sicc. Brit. !
Sanguisorba officinalis, L. E. Sonning Meadows; Hb. Rudge!
Peplis Portula, L. E. Bullmarsh Heath; Hb. Rudge!
Cœnanthe Lachenalii, Gmel. N. Moist ground near Frilford Heath, very scarce; F. Walker! Mr. Walker's specimen is somewhat immature, but I have little doubt that he is correct in referring it to this species.
Valeriana sambucifolia, Link. E. Sonning; Hb. Rudge!
Helminthia echioides, L. E. Sonning; Hb. Rudge!
Hieracium vulgatum, Fr. E. Near Wellington College; Rev. C. W. Penny!
Arctium majus, Schk. E. Sonning; Hb. Rudge!
A. tomentosum, L. N. Bagley Wood? (see Comp. Cyb. Brit., 530, and Journ. Bot. 1872, p. 332).
Carduus pratensis, L. N. Near Oakley House, Abingdon; F. Smith.
Centaurea nigra, L. *β. decipiens*. E. Sonning; Hb. Rudge!
Cineraria campestris, Rtz. M. Moulsoford Downs; A. Bennett.
Inula Pulicaria, L. E. Near Wellington College; Rev. C. W. Penny! Bullmarsh Heath, near Reading; Hb. Rudge!
Chrysanthemum Parthenium. E. Sonning; Hb. Rudge!
Doronicum plantagineum. N. "Found near Bessells Leigh"; Hb. Banks!
Gentiana campestris, L. W. White Horse Hill; Trimen!
Verbascum Lychnitis, L. E. Sonning Lane; Hb. Rudge!
V. Blattaria, L. There is a specimen from the Binfield locality in Hb. Rudge.
Antirrhinum majus, L. E. Sonning, "on an old wall"; Hb. Rudge!
A. Orontium, L. E. Sonning; Hb. Rudge!
Mentha rubra, Sm. E. Sonning; Hb. Rudge!
Teucrium Scordium, L. Berkshire; Hb. Sowerby!
Scutellaria minor, L. E. Bullmarsh Heath and Sonning; Hb. Rudge!
Myosotis collina, Hoffm. E. Wokingham; Hb. E. Forster! Mr. Penny's plant (Contrib., p. 53) was rightly named.
Pinguicula vulgaris, L. N. Near Oakley House, Abingdon; F. Smith!
Utricularia vulgaris, L. E. Dunstan Green, Sonning; Hb. Rudge!
Anagallis tenella, L. E. Bullmarsh Heath; Hb. Rudge!
Littorella lacustris, L. E. Abundant near Reading; B. J. Austin in "Science Gossip," 1873, p. 17.
Orchis ustulata, L. M. Moulsoford Downs; A. Bennett.

Narthecium ossifragum, L. E. Bullmarsh Heath; Hb. Rudge!

Polygonatum multiflorum, L. E. "Abundant in Finchampstead Woods"; Rev. C. W. Penny in litt. S. "In a field adjoining to the Wash at Newberry, and in divers other places in Barkshire. Observed by my worthy friend Mr. George Horsnell, Chirurgeon in London"; R. Syn. i., 96.

Hydrocharis Morsus-ranæ, L. E. Sonning; Hb. Rudge!

Lemna polyrhiza, L. E. Sonning; Hb. Rudge!

Juncus acutiflorus, Ehrh., E. Bullmarsh Heath; Hb. Rudge!

Phalaris arundinacea, L., var. *colorata*. E. Near Sonning; Hb. Rudge!

SHORT NOTES AND QUERIES.

MATERIALS OF INDIAN MATTING.—Can any of the readers of the "Journal of Botany" throw any light on the manufacture of the so-called Indian grass matting, very generally used in bedrooms to lay over the carpet before toilet-tables and washstands? There is no doubt that a good deal of it is really native Indian make, as I learn from a resident in Travancore that matting is there made in large quantities from the stems of a *Cyperus*, possibly *C. inundatus*, which grows abundantly in marshes and on the banks of rivers. Some other species also grow along with it; but their stems are never gathered for making this matting; indeed, experienced persons are always sent to collect the "grass" as it is called, so that the one kind only may be gathered. The matting is usually made three feet wide, but some stems grow to a length of nearly four feet. They are split down the middle and dried in the sun, which causes them to curl inwards and gives them a cylindrical appearance like whole stems. They are sometimes dyed, the colours being chiefly red, black, and yellow. The material used for keeping the stems together in the process of manufacture is made from the fibre of the *Agave americana*, which is grown in Travancore, and the fibre prepared from it by steeping the leaves for several days and then beating them to remove the pulp. I am told that this kind of work has been introduced in the industrial schools in Travancore, and large quantities of the matting are sent to England. It nevertheless seems to me highly probable that an article of this description, which could be readily made from the stems of *Scirpus lacustris* and such-like plants with profit in countries nearer home, is actually so made and sold as Indian matting. In the Kew Museum is a specimen of a similarly-made matting from Sweden, which helps to confirm my opinion. Any notes on the manufacture of this description of matting and of the plants used would be of interest.—JOHN R. JACKSON.

RUBUS REUTERI, Merc.—In 1871 the Rev. W. H. Purchas showed me a Bramble from Herefordshire, which I then named provisionally *R. Reuteri*, Merc. He has now sent several specimens of the same plant, from as he believes the same bush, gathered near Ross; these I believe to be the same as the *R. Reuteri* of Mercier (in Reuter Pl.

Vasc. de Genève, ed. 2, 272). It agrees very well with the description given at the place quoted, and with a specimen received as the authentic plant from M. Rapin, one of its discoverers near Geneva. It also agrees with the description given by Genevier ("Les Rubus du bassin de la Loire," 123). Genevier appears to be quite justified in placing it close to *R. hirtus*, from which alone and *R. saxicolus* he thinks it necessary to distinguish it. *R. saxicolus*, Müll. (Wirtg. Herb. Rub., ed. 1, no. 151, and ed. 2, no. 79) is very near *R. Güntheri* as stated by M. Genevier. He says that he has received *R. Reuteri* from Mr. Baker, gathered at Thirsk, and I have a specimen from the locality and collector which I name *R. Reuteri* with some slight doubt. It was gathered between Thirsk and Topcliff in 1851. I think that I have seen *R. Reuteri* near Bettws-y-Coed, in North Wales, but have not got a specimen, and so may very probably be wrong in that idea. I place *R. Reuteri* as a third primary variety of *R. glandulosus*, defined as follows:—Leaves quinate, coarsely and rather doubly dentate-serrate, with a few hairs on the veins beneath; terminal leaflet obovate-rhomboidal, acuminate; panicle truncate, its branches short, subcorymbose, few-flowered; upper branches nearly simple, 1—3 flowered, very aciculate, setose, and hairy; rachis nearly straight. Some of the prickles on the stem much stronger and declining or deflexed. Hab.: Near Sellack Marsh, Ross, Herefordshire; Rev. W. H. Purchas. It is interesting to find that we are by degrees adding more and more of the Continental forms to our catalogue.—C. C. BABINGTON.

APPLICATION OF FIBRE OF AGAVE.—One of the most recent applications of Agave fibre seems to be in the manufacture of a kind of square bag or basket, which was first seen a year or two since in toy shops, principally in the seaside towns. They have now become very general, and can be had at almost every hardware and toy shop. They are made chiefly of the twisted fibre of *Agave americana*, the principal part being of its natural colour, but a portion is dyed black and worked in with it. Whether the fibre is prepared in this country into the fine strong cord of which these bags are made, whether the bags themselves are made here, and whether other strong fibres are used, are questions which some readers may be able to answer. There is in the Kew museum a bag made of New Zealand Flax which is similar in shape and size to those usually sold, but the material is not so closely worked.—JOHN R. JACKSON.

PHALARIS PARADOXA.—This has been noticed near Swanage, Dorset, annually since 1847, when I first remarked it and sent it to the late Sir W. Hooker. I saw it there abundantly in 1872, growing amongst Wheat and Oats, and just as I have seen it in the neighbourhood of Florence.—JAMES HUSSEY in litt. to Dr. Hooker.

PANICUM CAPILLARE IN ESSEX.—My friend Mr. F. Bond has lately shown me some specimens of *Panicum capillare*, L., which he gathered a few years ago in Essex. This Grass is a native of North America, and in Europe has been found introduced near Toulon, at Nice, near Vienna, and in Belgium, so that it will

be interesting to notice it now, in case it should become established in England. Mr. Bond found six or eight plants about four years ago, and has since seen a few more. These were growing on a piece of ground about a mile from Colchester, on the Lexden road, and in the vicinity of several flower-seed farms, to whose agency Mr. Bond is inclined to attribute the introduction.—A. G. MORE. [A single plant of this was found by the Thames at Hampton Court in 1867; see Fl. Middx., p. 331.—*Ed. Journ. Bot.*]

Extracts and Abstracts.

RECENT ADDITIONS TO THE FLORA OF IRELAND.

BY ALEX. G. MORE, F.L.S., M.R.I.A.

(Concluded from p. 119.)

[*Centaurea paniculata*, Lam. A single plant in a cultivated field on the coast north of Rush; M. Dowd, 1870. No doubt accidentally introduced.]

Carduus arvensis, Curt. Var. *setosus*, M. B. (11.) In a stubble-field by the River Lennon, near Kilmacrenan, Donegal; Rev. T. Allin. The curious plant gathered by Mr. Allin at first sight looks like some hybrid, but it has the essential character of *C. arvensis*. The leaves are shaped somewhat like oak-leaves.

[*Crepis setosa*, Hall. Field between Browne's Hill and Carlow! 1867; R. Clayton Browne.]

Hieracium murorum, L. D. 2. Near Middleton; Rev. T. Allin.

H. tridentatum, Fries. D. 10. Marble Arch, Florencecourt, Co. Fermanagh; (found by Rev. S. A. Brennan) S. A. Stewart.

[*Campanula rapunculoides*, L. Sandhills at Newcastle, Down, about 50 plants in 1871, and no doubt introduced; S. A. Stewart. A few plants at the foot of a wall near the harbour of Bray, 1872; A. G. M.]

Obs. *Campanula latifolia*, L. Has not yet been rediscovered on the banks of the Barrow above New Ross, and it is much feared that a mistake was made in the name, especially as Mackay records only *C. latifolia* from the same district where other botanists have found *C. Trachelium* only.

Pyrola rotundifolia, L. D. 7. Sparingly on a large bog near Multyfarnham, Westmeath, 1870; D. M. (see Journ. Bot. ix., p. 300). How's locality, "In a bog by Roscree," belongs probably to this species, though referred by us to *P. minor*.

Monotropa Hypopitys, L. D. 9. Hazlewood, Sligo; (found by Miss Wynne) Lord Clermont.

Erythraea pulchella, Fries. D. 4. Curacloa, Wexford! J. Morrison. D. 5. On the North Bull! Dublin Bay, in tolerable plenty, October, 1867; D. Orr.

* *Cuscuta Trifolii*, Bab. D. 4. Quite established in clover fields at Fassaroe, near Bray; R. M. Barrington. D. 5. Found in 1863, by

Dr. W. G. Smith, in a field near the sea-shore at Ballybrack, occupying a space of a few square yards only, and here parasitical upon *Lotus*, *Daucus*, *Linum catharticum*, &c. (Dub. Nat. Hist. Soc. Proc., vol. v., p. 198). Once found near Kilkea, Mageney; J. Douglas.

Solanum nigrum, L. D. 4. Shore near Churchtown, Wexford, first observed in 1834, and still growing there in 1869; also on sands at Rostonstown; John Waddy. 5. Once seen in the churchyard at Kilkea, Kildare; John Douglas. 12. Sandy ground near Cushendun, from 1867 to 1871; Rev. S. A. Brenan.

[*Orobanche minor*, L. D. 4. On clover in two fields at Springhill, Enniscorthy, 1868; J. Morrison. A single plant next a Sweet Pea in the garden at Bloomfield, and another single plant on clover by the avenue at Bloomfield, 1867; Miss E. M. Farmer. Scarcely yet established as a naturalised plant.]

Lathræa Squamaria, L. 2. Plentiful for a long distance along the banks of the Blackwater, below Mallow, parasitical on *Ulmus montana* only, avoiding Beech, Horse Chestnut, Alder, and Sycamore; A. G. M. D. 7. In woods at Parsonstown, but rather scarce; M. Dowd. D. 9. In County Roscommon! Miss Acton. 10. Whitepark, Fermanagh; T. O. Smith.

[*Mimulus luteus*, Willd. 4. In the Dargle River, near Enniskerry; A. G. M. D. 10. On waste ground near the Glemornan River, Tyrone, two or three plants only; Dr. Sigerson. D. 12. Banks of the Bann, between the Cuts and Coleraine; S. A. Stewart.]

* *Veronica peregrina*, L. D. 9. Demesne at Rockingham, Roscommon, and in the garden and demesne at Hazlewood, Sligo; D. M. D. 11. Salthill Garden, Mount Charles, and Kilderry, Muff, 1870; H. C. Hart. Gweedore; Rev. W. M. Hind. Not found in D. 6.]

† *Mentha sylvestris*, L. D. 2. Roadside near Timoleague, 1871; Rev. T. Allin.

[*M. Requienii*, Benth. The Corsican Mint has been observed by the Rev. T. Allin growing abundantly in the street of Castle Townsend, evidently an escape from cultivation.]

Obs. *Calamintha Nepeta*, Clairv. Must be struck off the Irish list, as Professor Babington informs us that his specimen belongs to *C. officinalis*.

C. Clinopodium, Benth. D. 9. On the shore of the lake at Rockingham, Roscommon, 1871; D. M. It is to be feared that many of the localities given for this plant, especially those near Dublin, belong to *C. officinalis*.

‡ *Lysimachia Nummularia*, L. 4. Under a bank outside a boggy plantation between Monart House and Mill House, Wexford; Miss E. M. Farmer. 10. River bank, near Ardunshin, Fermanagh; Rev. S. A. Brenan. Banks of the river three miles above Colebrooke; T. O. Smith. 12. Dunminning, near Ballymena; apparently an escape from cultivation; N. Moore. *L. nemorum* has often been mistaken for this species.

Armeria maritima, Willd. 1. On the shores of Ross Island, Killybegs, growing with *Silene maritima*. Ascends to 3400 feet on Carn Tual; A. G. M.

[*Plantago media*, L. Reported by Mr. J. Douglas as found by him abundantly in a field near Malone's Gravel-pit, about one and a half

miles north of Straffan, Kildare; but not having seen any specimens, and not knowing the circumstances under which it occurred, we still hesitate to admit it as a native plant. A variety of *P. lanceolata*, with very broad leaves, occurs about Feltrim Hill, and was, probably, mistaken by Mr. White for *P. media*. This variety has also been sent to us from the North of Ireland, under the name of *P. media*.]

Obs. *Chenopodium urbicum*, L. Has not been rediscovered, and we fear that *C. murale* was the plant gathered in Upper Dominick Street.

Atriplex littoralis, L. D. 6. Great Aran Island; H. C. Hart. D. 11. Lighthouse at Fanet; *idem*.

Rumex maritimus, L. D. 2. Sparingly on the edge of a bog at Kilcoleman! Rev. T. Allin.

R. pulcher, L. D. 4. On the shore by the harbour at Bray, 1867-72; D. M. 5. Shore near the race-stand at Baldoyle, 1848, very sparingly; A. G. M.

* *Hippophaë rhamnoides*, L. D. 4. Thoroughly established on the sandhills at Kiltannel, north of Courtown, Wexford, where Miss Farmer has ascertained that it was planted about thirty years ago (see Journ. Bot. vi., pp. 255, 373). Mr. J. Morrison informs us that this shrub grows also on the sandy shores at Raven Point, near Wexford Harbour. 5. Planted on the sandhills at Rush, north of Dublin.

Euphorbia hyberna, L. D. 8. Plentiful at landing-place on Innisturk, an island off Mayo; (found by W. McMillan) S. A. Stewart. D. 11. Among large rocks and bushes on the south side of the Poisoned Glen, Dunlewy, Donegal, in no great quantity; N. Moore, 1867—thus confirming the accuracy of Robert Brown's observation. This spurge flowers in the early spring, commencing often in the middle of April. It frequently grows on open rocky banks and among heath on the mountains, ascending to 1500 feet or more in the Horse's Glen Mangerton; A. G. M.

Ceratophyllum demersum, L. 2. Blarney Lake (found by R. Mills); Rev. T. Allin. 12. In the Quoile river, Downpatrick; S. A. Stewart. Not found in Lough Neagh, which was given in mistake for Lough Leagh, near Killaleagh, Down, where the plant was discovered by Templeton in 1804.

Callitriche autumnalis, L. D. 1. By the shore of Ross Island, Lower Lake of Killarney, 1866; A. G. M. This will alter the latitude from 53° to 52°, and is the most southern locality in the British Islands. 12. Carrickmannan Lake, near Saintfield, Down; S. A. Stewart.

Salix phylicifolia, L. D. 9. North side of Ben Bulbin; D. M. This is the Willow given in our "Contributions," under the name of *S. procumbens*, which must now be expunged.

S. Grahami, Borr. D. 11. Among moss on the top of Muckish Mountain, Donegal, 1868 (see Journ. Bot. viii., p. 209; ix., p. 300); D. M. Mr. Leefe considers this little Willow closely allied to the Continental *S. retusa* (see Journ. Bot. ix., 36).

S. herbacea, L. The height of 1000 feet at which this plant grows on the top of Clontygearagh Mountain, Derry, is lower than any elevation at which it has been observed anywhere else in Great Britain.

† *Tamus communis*, L. D. 9. On a bushy hill rising from Lough

Gill, looking eastwards, and within the demesne of Hazlewood; Dr. T. E. Little, 1866. Abundantly in a wood on the shore of Lough Gill, far from any house or garden; W. Heron, 1868. Seen in this locality by D. M. in 1871, but was very probably planted there by the later owner of Hazlewood, who was very fond of introducing new plants in his demesne. *Tamus* is not mentioned in the late Mr. Wynne's own list of the plants seen by him in Sligo, and yet it could hardly have escaped his observation at Lough Gill.

Neotinea intacta, Reich. 6. Has been gathered every year since 1864 in the original locality, but has not yet been found anywhere else near Castle Taylor, except in the one large pasture-field in which it was first discovered. D. 9. On the north-east shore of Lough Corrib, not far from Cong, April, 1872; D. M. Flowers early, commencing at the end of April.

Spiranthes Romanzoviana, Cham. This is the name now adopted by Prof. Asa Gray and Dr. Hooker in preference to *S. gemmipara*. The plant still grows in many of the meadows and pastures near Castletown, commencing to flower in the middle of July.

Neottia Nidus-avis, Rich. D. 7. Woods at Rockingham, Roscommon; D. M. D. 9. Hazlewood, Sligo; D. M. D. 11. Woods Ards, at Donegal! M. Murphy.

† *Sisyrinchium anceps*, Lam. *S. Bermudiana*, L. 6. Abundant in marshy meadows and pastures along the river on both sides for four miles, from Woodford to Rossmore, forming conspicuous blue patches among the grass, and with every appearance of a native. Also in fields by the road from Woodford to Portumna, and on a hill half a mile N.E. from Woodford; M. Dowd, and Prof. E. P. Wright, 1870. The plant grows here in such profuse abundance that it seems hypercritical to challenge its indigenous origin; still when we see how inexplicably it has originated, how abundant it has become within a few years, and what a strong hold it has taken of the ground at Brisbane, Queensland, as recorded by Mr. C. Prentice, in Journ. Bot., ser. 2, i., p. 22 (1872); and considering that in England also it has lately become well established in Hampshire, we may well hesitate to accept the "Blue-eyed Grass" of Canada as an indubitable native of Ireland. If the locality in which it occurs is nearly as restricted as that of the *Spiranthes* at Berehaven, at least the Orchid lies, like all the other American and Iberian plants, quite close to the shore, and is a species of whose introduction or rapid extension we have not any experience.

† *Iris foetidissima*, L. A very doubtful native of Ireland, where it seems to have been formerly much cultivated, nor are we acquainted with any locality where it grows in a really natural manner.

† *Allium Babingtonii*, Borr. 6. In all three of the Islands of Aran; E. P. Wright. 8. South side of Clew Bay, between Croagh Patrick and the sea, but always near ruins or cottages; A. G. M.

Simethis bicolor, Kunth. 1. Certainly indigenous at Derrynane, where it grows on boggy, heathy, and turfy slopes, far away from the Abbey ruins, amidst heather and *Carices*, &c.

Eriocaulon septangulare, With. 1. Bog-holes at north end of Lough Carra, Kerry; Dr. Battersby. First found by Dr. Wade in 1801, as shown by a letter from him to Smith, in the Library of the

Linnean Society. In the Clonee (not Cromeen) Lakes, Kerry. 8. In a small lake, north side of Achill Island; A. G. M.

Juncus obtusiflorus, Ehrh. 1. Near Dingle, Kerry; D. M. D. 8. Boggy slopes at foot of Urrisbeg Mountain, Connemara; A. G. M.

Sparganium affine, Schn. D. 2. In Ballyscanlon Lake, near Tramore, Waterford, growing with *S. minimum*! R. M. Barrington. This extends the range to south of Ireland.

* *Acorus Calamus*, L. D. 12. Lakes at Hillsborough and Ballinahinch, Down, but most probably planted there; Templeton. Profusely on both sides of the Lagan for six or seven miles between Lisburn and Moira, Down; S. A. Stewart, 1866. This is an artificial cut, and the plant does not grow in Lough Neagh, nor in the river whence the Lagan Canal is drawn. Dr. Patrick Browne, in 1788, was aware of its occurrence in the county of Down, but does not give any special locality. According to the best authorities, *A. Calamus* is nowhere native in the West of Europe.*

Potamogeton polygonifolius, Pourr. Var. with long, thin, narrowly-lanceolate submerged leaves; var. *pseudo-fluitans*, Syme. 8. Plentiful in lakes and streams at Ballinahinch, Connemara; A. G. M. This is the plant doubtfully given in our book as *P. lanceolatus*, and is very characteristic of streams connected with lakes in mountainous districts. The long submerged leaves are very like those of *P. sparganiifolius*.

P. Lonchites, "Tuck.," Syme in Engl. Bot. D. 5. In the Boyne below Navan. By this name Dr Syme designates the *Potamogeton* from the Boyne, which we have doubtfully referred to *P. heterophyllus*.

P. lucens, Wulf. D. 7. In the Brosna, near Parsonstown; M. Dowd. Var. *decipiens*, Nolte. D. 5. In the Canal at Navan; Charles Bailey, 1868.

Najas flexilis, Rostk. 8. In 1869 I found it only in Lough Cregduff, three-quarters of a mile west of Roundstone, and it is probable that this is the same lake in which Prof. Oliver discovered it, and the only locality yet found in Ireland; A. G. M.

Eleocharis uniglumis, Link. 4. On the sandhills near Arklow; A. G. M. D. 5. On the shore east of Dollymount, opposite the North Bull, Dublin; M. Dowd. D. 12. Shore half a mile below Bangor, Down; S. A. Stewart.

Scirpus parvulus, R. et S. D. 4. Abundant at Arklow, on soft mud, overflowed at high tide on the north side of the River Ovoca; A. G. M., July 1868 (Journ. Bot. vi., pp. 254, 321).

Eriophorum latifolium, Hoppe. D. 8. Bog on the north-west side of Urrisbeg Mountain, near Roundstone, growing with *Erica mediterranea*, 1869; A. G. M.

Obs. *Eriophorum alpinum*, L. Was announced in 1866 as having been gathered by Mr. Ryder on the north shore of Gurthaveha Lake, near Millstreet, County Cork (Dublin Nat. Hist. Soc. Proc. v., p. 112), but it is now believed that some mistake was made, as the plant cannot be found in the alleged locality. (See Brit. Association Rep. 1871, sec. D, p. 129; and Journ. Bot. ix., p. 279.)

Carex divisa, Huds. 5. Nearly extinct in the station discovered

* See Journ. Bot. vol. ix. (1871), pp. 163, 264.—[Ed.]

by D. M., but two large and flourishing patches were found (1871) in a damp meadow close to the Glass Works on the north bank of the Liffey; A. G. M.

C. axillaris, Good. D. 1. Salt Marsh, near Kinsale! I. Carroll, 1866. This is the only locality in Ireland from which we have seen authentic specimens. *C. divulsa* has more than once been miscalled *axillaris*.

C. rigida, Good. D. 4. Top of Lugnaquilla, Wicklow; A. G. M.

C. punctata, Gaud. 1. Plentiful in boggy or marshy meadows near the chapel at Ardroom, at some little distance from the sea; A. G. M.

Calamagrostis Epigejos, Roth. D. 6. Between the road and the sea, near Killeany, Great Aran Island, in two places only; H. C. Hart, 1869.

C. stricta, Nutt. 10. Scawdy Island, near Maghera, is in Tyrone, not Armagh; S. A. Stewart. Hence Armagh must be erased from the list of counties. 12. Shores of Lough Beg, one mile south of Church Island; R. Tate.

Aira uliginosa, Weihe. D. 8. Found in July, 1869, growing plentifully on the swampy borders of Lough Creg-duff, near Roundstone; and afterwards traced by me in many localities through the district extending from Clifden to Kilkieran, Connemara; A. G. M. (see Journ. Bot. vii., p. 265).

Poa compressa, L. D. 10. On the bank by roadside, half a mile from Portadown towards Lurgan! W. M'Millen. D. 12. Roadside between Ballycastle and Ballintoy; D. M.

Sclerochloa Borreri, Bab. The suggestion as to the possible parentage of this Grass must be retracted, or at least qualified, since only *S. distans* and *S. maritima* grow along with it in the North Lots, Dublin.

† *S. procumbens*, Beauv. D. 12. On Albert Quay, Belfast! in small quantity, and in one place only; S. A. Stewart. This Grass has not lately been gathered near Dublin, and it is believed that *S. Borreri* was mistaken for it in the metropolitan district. *S. procumbens* seems very rare, and is open to some suspicion of having been introduced both at Cork and Belfast, which are the only two Irish localities.

Festuca Myurus, L. D. 1. Walls at Dingle and Milltown, Kerry; A. G. M. 2. Common at Avoncore, and occurs in both East and West Cork; Rev. T. Allin (see Journ. Bot. ix., p. 18) D. 4. Springhill, Enniscorthy; J. Morrison. Walls at Arklow and Wicklow; A. G. M. D. 6. Near Ballyvaughan, Clare; Rev. T. Allin. Probably not unfrequent in the middle and south of Ireland.

Triticum pungens, Pers. D. 4 and 5. Frequent on the Murrough of Wicklow, and on banks and along ditches on the coast of probably all Ireland. A large form found on the shore near Rush has for many years been cultivated in the Botanic Gardens, Glasnevin, under the name of *T. Moorei*.

Equisetum hyemale, L. D. 6. At Lough Atalia, in the Great Island of Aran; H. C. Hart. D. 10. Banks of the Colebrooke River, Fermanagh; T. O. Smith. D. 11. Little Bins, Fanet; H. C. Hart. The plant of the Dundrum sandhills probably will be found to belong to *E. Moorei*.

E. Moorei, Newman (1853). Milde, the highest recent authority, places this plant under *E. hyemale* as var. *Schleicheri* (Milde, 1858); but, as already observed in Journ. Bot. vi., *E. Moorei* is the older name, and should be retained, in preference also to var. *paleaceum*, Schleicher, adopted by Dr. Hooker in his "Student's Flora," but which has been rejected by Milde as ambiguous. 4. Sandhills north of Courtown, Wexford. Sandhills near Arklow, and thence northwards in many places along the coast, extending to near Seapark House, three miles south of Wicklow.

E. trachyodon, A. Braun. *E. Mackaii*, Newm. D. 2. Near St. Ann's, Blarney! (R. Mills); Rev. T. Allin, 1871. This will extend the range to South of Ireland.

E. Wilsoni, Newm. D. 7. Canal near Mullingar; R. W. Rawson. D. 8. Shores of Lough Bulard, near Roundstone; A. G. M. D. 6? Shore of Lough Carra, Mayo; J. Ball. Probably this, rather than *E. trachyodon*.

Polypodium Phegopteris, L. D. 2. Rocks above Gurthaveha Lake, near Millstreet, with *Asplenium viride* and *Polyst. aculeatum*; A. G. M.

Asplenium Adiantum-nigrum. L.; var. *acutum*, Bory. D. 6. By the Shannon, near Corgrig, Foynes! Miss C. G. O'Brien. D. 8. Frequent in Connemara and south-west Mayo; G. H. Kinahan.

Adiantum Capillus-Veneris, L. 1. Sea-wall under Mount Trenchard, near Foynes; Rev. L. O'Brien. 8. Hill north-north-east of Sheffey, five miles from Killery Harbour; G. H. Kinahan. Cliff on north-west side of Achill Island! Mrs. Boycott. D. 11. In one place on the cliffs of Slieve League (found by Rev. L. O'Brien). Rev. R. J. Gabbett.

Isoetes lacustris, L. D. 2. In Gurthaveha Lake, near Millstreet; A. G. M. 4. A long slender form, some of whose fronds measured 26 inches, is in autumn washed ashore from deep water at Upper Lough Bray. Milde gives this lake as a station for *I. echinospora*, which, however, I have not succeeded in finding there; A. G. M. In Lough Luggelaw; D. Orr.

NEW SPECIES OF PHANEROGAMOUS PLANTS IN PERIODICALS PUBLISHED IN GREAT BRITAIN DURING THE YEAR 1872.

THE following alphabetical list includes the new genera and species published during 1872 in the "Botanical Magazine," "Gardener's Chronicle," "Icones Plantarum," "Journal of Botany," "Journal of Linnean Society," and "Refugium Botanicum." In the "Transactions of the Linnean Society," vol. xxviii., pp. 319-432 published during the year, is a monograph of the South American species of *Hippocrateaceæ* by Mr. Miers; the new species in this have not been included.

ACROSTICHUM (ELAPHOGLOSSUM) PRESTONI, Baker (Filices).—Rio Janeiro. (Gard. Chron., p. 1555.)

ACROSTICHUM (CHRYSDIUM) WALLII, *Baker* (Filices).—Ceylon. (Journ. Bot. x., p. 146.)

ÆRIDES HOULLEIIANUM, *Rehb. f.* (Orchideæ).—Brazil. (Gard. Chron., p. 1194.)

ALBUCA ANGOLENSIS, *Welw.* (Liliaceæ).—Angola. (Ref. Bot., 336 and Gard. Chron., p. 392—by error *A. abyssinica*.)

A. TENUIFOLIA, *Baker*.—Cape. (Ref. Bot., 335.)

ALPINIA STACHYODES, *Hance* (Scitamineæ).—Hongkong. (Journ. Linn. Soc. xiii., p. 126.)

ANAGLYPHA ACICULARIS, *Benth.* (Compositæ, Inuloideæ).—Cape. Burchell, n. 5159. (Ic. Plant., 1109.)

ANGRÆCUM ARTICULATUM, *Rehb. f.* (Orchideæ).—Madagascar. (Gard. Chron., p. 73.)

ANTHERICUM BURKEI, *Baker* (Liliaceæ).—Cape of Good Hope. (Journ. Bot. x., p. 140.)

A. FLAGELLIFORME, *Baker*.—Cape of Good Hope. (Journ. Bot. x., p. 140.)

A. GERRARDI, *Baker*.—Cape of Good Hope. (Journ. Bot. x., p. 137.)

A. INTRICATUM, *Baker*.—Cape of Good Hope. (Journ. Bot. x., p. 140.)

A. THYRSOIDEUM, *Baker*.—Cape of Good Hope. (Journ. Bot. x., p. 139.)

A. ZEYHERI, *Baker*.—Cape of Good Hope. (Journ. Bot. x., p. 140.)

APHELANDRA SULPHUREA, *Hook. f.* (Acanthaceæ).—Guyana. (Bot. Mag., 5951.)

ATYLOSIA GEMINIFLORA, *Dalz.* (Leguminosæ).—W. India. (Journ. Linn. Soc. xiii., p. 185.)

A. GLANDULOSA, *Dalz.*—Bombay. (Journ. Linn. Soc. xiii., p. 186.)

AXINIPHYLLUM, *Benth.* (Compositæ, Helianthoideæ).—*A. corymbosum*, *Benth.*—Mexico. (Ic. Plant., 1118.)—*A. tomentosum*, *Benth.*—Mexico. (Ic. Plant. xii., p. 17.)

BATEMANIA BURTII, *Endr. et Rehb. f.* (Orchideæ).—Costa Rica (Gard. Chron., p. 1099.)

BAUHINIA (PILEOSTIGMA) FAVEOLATA, *Dalz.* (Leguminosæ).—W. India. (Journ. Linn. Soc. xiii., p. 188.)

BOLBOPHYLLUM LEMNISCATUM, *Parish* (Orchidaceæ).—Moulmein. (Bot. Mag., 5961.)

BRACHYACTIS MENTHODORA, *Benth.* (Compositæ, Asteroideæ).—Sikkim. (Ic. Plant., 1106.)

B. OBOVATA, *Benth.*—Mesopotamia or Kurdistan, Kotschy, n. 546a (Ic. Plant. xii., p. 7.)

B. ROBUSTA, *Benth.*—Himalaya. (Ic. Plant. xii., p. 6.)

BROWNEA BIRSCHHELLII, *Hook. f.* (Leguminosæ, Cæsalpineæ).—Caracas. (Bot. Mag., 5998.)

BRUNSVIGIA COOPERI, *Baker* (Amaryllidaceæ).—Cape. (Ref. Bot., 330.)

BULBINE MACKENZII, *Hook. f.* (Liliaceæ).—Natal. (Bot. Mag., 5955.)

BUXUS HARLANDI, *Hance* = *B. sempervirens*, *Benth.* non L. (Buxaceæ).—Hongkong. (Journ. Linn. Soc. xiii., p. 123.)

CALATHEA VESTITA, *Baker* (Marantaceæ).—Bahia. (Ref. Bot., 311.)

CALOSTEPHANE, *Benth.* (Compositæ, Inuloideæ).—*C. divaricata*, *Benth.*—South-east Tropical Africa. (Ic. Plant., 1111.)

CAMPTOSTEMON, *Mast.* (Malvaceæ, Bombaceæ).—*C. Schultzii*, *Mast* North Australia. (Ic. Plant., 1119.)

CAREX FABRI, *Hance* (Cyperaceæ).—North China. (Journ. Linn. Soc. xiii., p. 90.)

C. SIDEROSTICTA, *Hance.*—North China. (Journ. Linn. Soc. xiii., p. 89.)

CATASETUM SCURRA, *Rehb. f.* (Orchideæ).—Demerara. (Gard. Chron., p. 1003.)

CELOSIA HUTTONI, *Mast.* (Amarantaceæ).—Java. (Gard. Chron., p. 215, fig. 84.)

CERATOPYXIS, *Hook. f.* (Rubiaceæ)=*Rondeletia*? *verbenacea*, *Griseb.*—Cuba, *Wright*, n. 2625. (Ic. Plant., 1195.)

CHRYSANTHEMUM (*PYRETHRUM*) *MAWII*, *Hook. f.* (Compositæ).—Morocco. (Bot. Mag., 5997.)

CHUSQUEA SPENCEI, *Ernst.* (Gramineæ).—Naiguatá, Caracas. (Journ. Bot. x., p. 262.)

CIENTKOWSKIA KIRKII, *Hook. f.* (Scitamineæ).—Zanzibar. (Bot. Mag., 5994.)

CLAPPIA AURANTIACA, *Benth.* (Compositæ, Helenioideæ).—Antigua. (Ic. Plant., 1104.)

CÆLIOPSIS, *Rehb. f.* (Orchideæ).—*C. hyacinthosma.*—Panama. (Gard. Chron., p. 9.)

CORYNULA, *Hook. f.* (Rubiaceæ)=*Mitchella pilosa*, *Benth.*—Peru, *Spruce*, n. 5505. (Ic. Plant., 1123.)

CORYSANTHES CHEESEMANI, *Hook. f.* (Orchideæ).—New Zealand. (Ic. Plant., 1120.)

CRASSULA QUADRIFIDA, *Baker*, (Crassulaceæ).—Cape. (Ref. Bot., 298.)

DASYLIBION LAXIFLORUM, *Baker* (Liliaceæ).—Mexico. (Journ. Bot. x., p. 299.)

DENDROBIUM (*PEDILONUM*) *AMETHYSTOGLOSSUM*, *Rehb. f.* (Orchideæ).—Philippine Islands. (Gard. Chron., p. 109.)

D. CHRYSOCREPIS, *Parish et Reich. f. Ms.*—Moulmein. (Bot. Mag., 6007.)

D. RHODOCENTRUM, *Rehb. f.*—Hort. Buller. (Gard. Chron., p. 426.)

DEPARIA NEPHRODIOIDES, *Baker* (Filices).—Lord Howe's Islands. (Gard. Chron., p. 253.)

DESMANTHODIUM, *Benth.* (Compositæ, Helianthoideæ).—*D. perfoliatum*, *Benth.*—Mexico. (Ic. Plant., 1116.)—*D. ovatum*, *Benth.*—Mexico. (Ic. Plant. xii., p. 15.)

DIDYMOCHLAMYS, *Hook. f.* (Rubiaceæ).—*D. Whitei*, *Hook. f.*—New Granada. (Ic. Plant., 1122.)

DORSTENIA BOWMANNIANA, *Baker* (Moreæ).—Brazil. (Ref. Bot., 303.)

EPIDENDRUM ADVENA, *Rehb. f.* (Orchideæ).—Brazil. (Gard. Chron., p. 194.)

ERIA (*FLAVÆ*) *BERRINGTONIANA*, *Rehb. f.* (Orchideæ).—Hort. (Gard. Chron., p. 666.)

ERANTHEMUM ELATUM, *Kurz* (Acanthaceæ).—(Journ. Bot. x., p. 46.)

FERGUSONIA, *Hook. f.* (Rubiaceæ).=*Borreria tetracocca*, Thwaites Enum., p. 442.—Ceylon. (Ic. Plant., 1124.)

FRESENIA FASCICULATA, *Bolus* (Compositæ, Asteroideæ).—Cape. (Ic. Plant., 1108.)

GLADIOLUS PURPUREO-AURATUS, *Hook. f.* (Iridaceæ).—Natal. (Bot. Mag., 5944.)

GYMNOGRAMMA (EUGYMNOGRAMMA) DECOMPOSITA, *Baker* (Filices).—Andes. (Gard. Chron., p. 1587.)

HEMITELIA (AMPHICOSMIA) MOOREI, *Baker* (Filices).—Lord Howe's Islands. (Gard. Chron., p. 252.)

HERMANNIA FASCICULATA, *Baker* (Sterculiaceæ).—Cape. (Ref. Bot., 289.)

HOMOCHÆTE, *Benth.* (Compositæ, Inuloideæ).—*H. conferta*, Benth. —Cape. (Ic. Plant., 1110.)

IRIS ROBINSONIANA, *F. Müll.* (Iridaceæ).—Lord Howe's Islands. (Gard. Chron., p. 393, fig. 123, 124.)

I. TOMIOLOPHA, *Hance.*—China. (Journ. Bot. x., p. 229.)

KNIPHOFIA CAULESCENS, *Baker* (Liliaceæ).—Cape. (Bot. Mag., 5946.)

LÆLIA JONGHEANA, *Rchb. f.* (Orchideæ).—Brazil. (Gard. Chron., p. 425, fig. 128.)

LEUCOPHOLIS LATIFOLIA, *Benth.* (Compositæ, Inuloideæ).—Rio de Janeiro. (Ic. Plant. xii., p. 14.)

LINARIA MAROCCANA, *Hook.* (Scrophulariaceæ).—Morocco. (Bot. Mag., 5983.)

LIPARIS SAUNDERSIANA, *Rchb. f.* (Orchideæ).—Jamaica. (Gard. Chron., p. 1003.)

LISTROSTACHYS CEPHALOTES, *Rchb. f.* (Orchideæ).—West Tropical Africa. (Gard. Chron., p. 1687.)

LOCKHARTIA AMÆNA, *Endr. et Rchb. f.* (Orchideæ).—Costa Rica., (Gard. Chron., p. 666.)

LOPHOLÆNA PLATYPHYLLA, *Benth.* (Compositæ, Senecionideæ).—Cape. (Ic. Plant. 1113.)

MACROZAMIA CORALLIPES, *Hook, f.* (Cycadeæ).—New South Wales. (Bot. Mag., 5943.)

MASDEVALLIA CHIMÆRA, *Rchb. f.* (Orchideæ).—South America. (Gard. Chron., p. 463.)

MESOSPINIDIUM VULCANICUM, *Rchb. f.* (Orchideæ).—Tropical America Spruce, n. 6243. (Gard. Chron., p. 393.)

MILLETTIA PALLIDA, *Dalz.* (Leguminosæ).—Bombay. (Journ. Linn. Soc. xiii., p. 187.)

MORMODES FRUCTIFLEXUM, *Rchb. f.* (Orchideæ).—Costa Rica. (Gard. Chron., p. 141.)

MUSA SANGUINEA, *Hook. f.* (Musæ).—Assam. (Bot. Mag., 5975.)

NORMANDIA, *Hook. f.* (Rubiaceæ).—*N. Neo-caledonica*, *Hook. f.*—New Caledonia. (Ic. Plant., 1121.)

OCTOMERIA TRICOLOR, *Rchb. f.* (Orchideæ).—Brazil. (Gard. Chron., p. 1035.)

ODONTOGLOSSUM RINGENS, *Rchb. f.* (Orchideæ).—Peru. (Gard. Chron., p. 1035.)

- O. STENOCHILUM*, *Lind. et Rehb. f.* (Gard. Chron., p. 969.)
- OLIVÆA*, *Schultz Bip.* (Compositæ, Helenioideæ).—*O. tricuspis*, Sch. Bip. Mexico. (Ic. Plant., 1103.)
- ONCIDIUM ALCICORNE*, *Rehb. f.* (Orchideæ). New Grenada. (Gard. Chron., p. 969.)
- O. (CYRTOCHILUM) INSCULPTUM*, *Rehb. f.* (Gard. Chron., p. 1035.)
- ONCOBA STIPULATA*, *Oliv.* (Bixineæ).—Tropical Africa. (Trans. Linn. Soc. xxix., p. 31.)
- ONDETIA*, *Benth.* (Compositæ, Inuloideæ).—*O. linearis*, Benth.—Cape. (Ic. Plant., 1112.)
- OROBANCHE OMBROCHARES*, *Hance* (Orobanchaceæ).—North China. (Journ. Linn. Soc. xiii., p. 84.)
- O. PYCNOSTACHYA*, *Hance*.—North China. (Journ. Linn. Soc. xiii., p. 84.)
- OXYTROPIS PSAMMOCHARIS*, *Hance* (Leguminosæ).—North China. (Journ. Linn. Soc. xiii., p. 78.)
- O. SUBFALCATA*, *Hance*.—North China. (Journ. Linn. Soc. xiii., p. 78.)
- PENTACHÆTA GRACILIS*, *Benth.* (Compositæ, Asteroideæ).—Mexico. (Ic. Plant., 1101.)
- PEPEROMIA PUBERULA*, *Baker* (Piperaceæ).—Vera Cruz. (Ref. Bot., 302.)
- PESCATOREA DAYANA*, *Rehb. f.* (Orchideæ).—New Grenada. (Gard. Chron., p. 1618.)
- PHILAGERIA* (genus hybridum inter *Philesiam buxifoliam* (mas.) et *Lapageriam roseam* (fœm.))—*P. Veitchii*, Mast. Hort. Veitch. (Gard. Chron., p. 358, fig. 119, 120.)
- PHILODENDRON RUBRO-PUNCTATUM*, *Hook. f.* (Aroideæ).—Brazil. (Bot. Mag., 5947.)
- PHRYNIUM UNILATERALE*, *Baker* (Marantaceæ).—Madagascar. (Ref. Bot., 312.)
- PHYCELLA MACLEANICA*, *Baker* (Amaryllidaceæ).—Chili. (Ref. Bot., 332.)
- RHYNCHOSIA MOLLISSIMA*, *Dalz.* (Leguminosæ).—Kandesh, West India. (Journ. Linn. Soc. xiii., p. 187.)
- SALVIA (PLETHIOSPHACE) DICHROMA*, *Hook. f.* (Labiatae).—Morocco. (Bot. Mag., 6004.)
- S. (PLETHIOSPHACE) POGONOCALYX*, *Hance*.—North China. (Journ. Linn. Soc. xiii., p. 85.)
- S. TARAXACIFOLIA*, *Coss. mss.*—Morocco. (Bot. Mag., 5991.)
- SARCANTHUS MACRODON*, *Rehb. f.* (Orchideæ).—Madras. (Gard. Chron., p. 1555.)
- SCILLA BARBERI*, *Baker* (Liliaceæ).—Cape. (Journ. Linn. Soc. xiii., p. 247.)
- S. CURRORI*, *Baker*.—Guinea. (Journ. Linn. Soc. xiii., p. 249.)
- S. EXIGUA*, *Baker*.—Natal. (Journ. Linn. Soc. xiii., p. 247.)
- S. HANBURI*, *Baker*.—Antilibanus. (Journ. Linn. Soc. xiii., p. 235.)
- S. KIRKII*, *Baker*.—Zanzibar. (Journ. Linn. Soc. xiii., p. 254.)
- S. KRAUSSII*, *Baker*.—Natal. (Journ. Linn. Soc. xiii., p. 243.)
- S. VERSICOLOR*, *Baker*.—Cape. (Ref. Bot., 305.)
- SPATHODEA (MARKHAMIA) CAUDA-FELINA*, *Hance* (Bignoniaceæ).—Island of Hai-nan, China. (Journ. Bot. x., p. 257.)

STACHYCEPHALUM—*Schultz—Bip.* (Compositæ, Helianthoideæ).—*S. Mexicanum*, Sch. Bip. Mexico. (Ic. Plant., 1102.)

STELIS CANALICULATA, *Rchb. f.* (Orchideæ).—Bogota. (Gard. Chron., p. 1718.)

STENOMESSION PEARCEI, *Baker* (Amaryllidaceæ).—Andes of Bolivia. (Ref. Bot., 308.)

TEPHROSIA ERIOSEMOIDES, *Oliv.* (Leguminosæ).—Tropical Africa. (Trans. Linn. Soc. xxix., p. 57, tab 32.)

TRICHOGLOTTIS FASCIATA, *Rchb. f.* (Orchideæ).—East Tropical Asia? (Gard. Chron., p. 699.)

TRICHOPILIA ROSTRATA, *Rchb. f.* (Orchideæ).—New Grenada. (Gard. Chron., p. 798.)

TROPIDIA GRANDIS, *Hance* (Orchideæ).—Hongkong. (Journ. Linn. Soc. xiii., p. 126.)

URGINEA BECCARII, *Baker* (Liliaceæ).—Abyssinia. (Journ. Linn. Soc. xiii., p. 223.)

U. GRANDIFLORA, *Baker*.—Hor Tamanib, Red Sea. (Journ. Linn. Soc. xiii., p. 224.)

UVARIA KIRKII, *Oliv.* (Anonaceæ).—Zanzibar. (Bot. Mag., 6006.)

YUCCA ELLACOMBII, *Baker* (Liliaceæ).—Southern United States? (Ref. Bot., 317.)

Y. ENSIFOLIA, *Baker*.—Mexico? (Ref. Bot., 318.)

Y. EXIGUA, *Baker*.—Southern United States? (Ref. Bot., 314.)

Y. GUATEMALENSIS, *Baker*.—Mexico and Guatemala. (Ref. Bot., 313.)

ZYGOPETALUM (KEFERSTEINIA) LACTEUM, *Rchb. f.* (Orchideæ).—Chiriqui. (Gard. Chron., p. 1290.)

Notices of Books.

A General System of Botany, descriptive and analytical. By E. LE MAOUT and J. DECAISNE. With 5500 figures by L. STEINHEIL and A. RIOCREUX. Translated from the original by Mrs. HOOKER. The Orders arranged after the Method followed in the Universities and Schools in Great Britain, its Colonies, America, and India; with Additions, an Appendix on the Natural Method, and a Synopsis of the Orders; by J. D. HOOKER, C.B., &c., &c. London: Longmans and Co. 1873. (Pp. 1066.)

Just a century has passed since Antoine Laurent de Jussieu read before the Académie des Sciences his celebrated paper on the *Ranunculaceæ*, which gave its author the clue to that philosophical grouping of genera under natural orders published the next year, 1774, upon which as a foundation the "Natural System" as it at present exists has been laboriously constructed by many builders.

To afford a comprehensive knowledge of this system the original "Traité Général de Botanique" of MM. Le Maout and Decaisne,

published in 1868, has no doubt greatly contributed. Clearly written, illustrated far more accurately and copiously than any previous book of its class, and published at a very cheap price, its circulation extended much beyond France, and in this country the work was found to supply to a great extent a want much felt—a well-illustrated general account of the vegetable kingdom, of scientific merit, and on a level with the great progress made of late years in the department of systematic Botany. The chief drawback to its general use in England, besides the use of the French language, lay in the sequence of the natural families, which is that of A. de Jussieu, still used in the lectures at the Jardin des Plantes, but little familiar to English students.

In this English translation the natural orders have been rearranged in accordance with the sequence—a modification of De Candolle's—in general use in this country, and adopted in the latest general view of the whole subject, Bentham and Hooker's "*Genera Plantarum*," so far as that important work has yet reached. The editor has in addition inserted in their proper position twenty-four orders omitted in the original work, and has added under the larger orders outlines of the latest classification of the genera under tribes and sub-tribes.

The book is divided into two parts. The first, "*Organography and Glossology*," has been condensed from the original, and now consists of little more than 100 pages, into which it has been essayed to compress a succinct but comprehensive introduction to Botany. It is preceded by a bald introductory chapter. The book would have lost little of value if this first part had been altogether omitted; it is by no means on an equality with the body of the work, and there are several better short elementary treatises of similar scope already existing in the English language. Many of the figures, too, in this part are the old familiar ones of the text-books, and therefore do not possess the value of those in the systematic portion, which, as we are told by the editor, were largely prepared from "M. Decaisne's unique collection of analytical drawings, the fruits of his life-long botanical labours." The account of Phyllotaxy is good and well illustrated. One is sorry to see that the editor did not correct the misleading use of the terms right- and left-handed rotation as applied to twining organs, which are here defined to mean exactly the reverse of their signification in all English text-books.

The second part, the body of the work, consists of Illustrations and Descriptions of the Natural Families. The original work is here closely followed, the only alteration being as above noticed in sequence and the intercalation of some additions by the editor. The mode in which each family is treated is very simple—a short diagnosis consisting of its most essential characters, followed by a full description illustrated by a profusion of figures of singular excellence both from a botanist's and an artist's point of view, a selection of illustrative genera (to which the editor has often largely added), and a sketch of the affinities, geographical distribution, and properties of the order. In comparing it with Lindley's "*Vegetable Kingdom*," the only work of equal authority in our language, it is impossible to deny to the older treatise several advantages over its more recent rival. The copious citation of other authors, a very useful feature in Lindley's work, is almost absolutely wanting in the present volume, and the

account of the uses of plants is far less complete; nor must we forget that Lindley gave a full list of all known genera under each order, instead of a selection. On the other hand, we have here greater clearness and simplicity of description, and far more copious pictorial illustration, besides the benefit of having been written seventeen years later, and, in this English edition, of the editor's critical revision up to the present year. Thus under *Rubiaceæ* and *Compositæ* we find sketches of the arrangement of these vast families adopted in the volume just published of the "Genera Plantarum," and in the large Monopetalous and Apetalous orders outlines of the most recent classification. At p. 644 will be found a sketch of the arrangement of the *Paronychieæ* prepared for the "Genera Plantarum." The Monocotyledons are very fully treated, and the Glumaceous orders are described and illustrated with much greater fulness than is usual; the same remark applies with greater force to the Cryptogams, the account of which is admirably clear.

A point which affords room for a good deal of speculation is upon what principle the terminations of the natural orders have been decided. We have in this book, for instance, *Malvaceæ*, *Paronychieæ*, *Bixineæ*, *Hypericineæ*, *Chenopodeæ*, *Lythrarieæ*, and other forms. The simple rule upon which the first was made might be as well applied to the rest, and indeed two or three modifications would cover all possible cases. The matter is not of the greatest importance, but simplicity and uniformity of treatment would be more in accordance with the general spirit of classification, and be practically more convenient, especially in a text-book for students.

It is to the appendix, by the editor, in which the orders of the body of the work are arranged under groups, or "cohorts," in accordance with their natural affinities, that the botanist will turn with most interest, as it embodies a sketch of the probable arrangement to be followed in future parts of the great work already alluded to, the "Genera Plantarum" of Bentham and Hooker, at present only completed to the end of the *Compositæ*. The *Monopetalæ* in this arrangement are divided into two series with inferior and superior ovary respectively, and conclude with the "anomalous order" *Plantagineæ*; and the *Apetalæ* into two subdivisions, characterised in the same way, the petaloid *Nyctagineæ* leading off, and the Santalal cohort (containing *Loranthaceæ*, *Santalaceæ*, and *Balanophoraceæ*) closing the series (with the exception of the anomalous *Podostemaceæ*, which are "of very dubious affinity"). The *Gymnosperms* follow. In the Monocotyledons we again find the adhesion of the perianth to the ovary made to afford the character of leading importance, separating the first division from the second with a superior ovary containing the bulk of the class. The Cryptogams are grouped in the usual manner.

Prefixed to this conspectus is a short introduction on the Classification of Plants, which will be read with great pleasure by all interested in the perplexing difficulties which beset all attempts to express affinities by a lineal series. The plain and decisive manner in which these questions are here treated shows a mind long accustomed to deal with such puzzles, and presents a singularly clear view of the points at issue, and their practical solution by the author. As a sample the following may be quoted:—"I am disposed to approve of the sequence

adopted by De Candolle, which places *Monopetalæ* in the centre of the series, flanked on either hand by *Polypetalæ* and *Incompletæ*, which two latter, as remarked above, have many cross affinities, but have few affinities of consequence with *Monopetalæ*. The cohorts may thus be fancifully likened to the parti-coloured beads of a necklace joined by a clasp, the beads touching at similarly coloured points of their surfaces. The position of each bead in the necklace is determined by the predominance of colours common to itself and those nearest to it, whilst the number and proportion of the other colours which each bead presents indicate its claims to be placed elsewhere in the necklace—in other words, such colours represent the cross affinities which the cohorts display with others remote from the position they occupy.”

H. T.

Handbook of Hardy Trees, Shrubs, and Herbaceous Plants, Containing Descriptions, Native Countries, &c., of a Selection of the Best Species in Cultivation, &c. Based on the French Work of MM. DECAISNE and NAUDIN, entitled “Manuel de l'Amateur des Jardins,” and including the original woodcuts by Riocreux and Leblanc. By W. B. HEMSLEY. London: Longmans. 1873. (Pp. xliv., 688. Fig. 264.)

THIS is a book intended for amateurs and gardeners who have some acquaintance, though not an extensive one, with the science of Botany. The great part of the work consists of descriptive garden Botany—that is, of brief description in plain language of a large selection of cultivated species hardy in English gardens. These are arranged in accordance with the natural system, in the order usually followed by botanists in this country, and short diagnoses of the natural families



Eranthis hyemalis ($\frac{1}{2}$ nat. size).

and genera are given. An artificial key to the natural orders is prefixed (a modification of that in Lindley's “Vegetable Kingdom”), by which it is hoped that an unknown plant may be referred to its family. Technical language is, as far as possible, avoided, and the more obscure characters, such as those derived from the ovule and ovary, are altogether omitted; a glossary is also given, and the Latin names are all accented and their derivation traced.

In addition to the descriptive part, the book contains a short treatise on practical gardening, with a very brief outline of vegetable physiology prefixed, making up less than 100 pages.

Those who are acquainted with MM. Decaisne and Naudin's extensive work will not need to be told that the book before us is prac-

tically a new treatise, though Mr. Hemsley has no doubt been considerably indebted to the eminent botanists and horticulturists named. The arrangement of the material is entirely different; many plants admitted in the French book as being hardy in France are omitted, whilst on the contrary many others have been added; the descriptions, too, are Mr. Hemsley's own. The former connection of the author with Kew Herbarium, where he showed himself a careful and accurate botanist, affords a reasonable expectation, which is not disappointed on investigation, that such work has been well done. So far as they go, the



Primula sinensis ($\frac{1}{4}$ nat. size).

accounts of the species, remarks on their history, native countries, &c., may be confidently accepted as correct; their fault lies in their brevity, a matter doubtless unavoidable if the book was to be kept to the limit of a volume.

But it is no doubt the illustrations which are the attractive feature. For delicacy and truthfulness these can scarcely be surpassed, and are certainly far ahead in these respects of any woodcuts of plants hitherto produced in this country. The wish to possess such beautiful and lifelike portraits of garden favourites will doubtless cause many to purchase the Handbook who are less able to appreciate the careful and concise descriptions which accompany them. By the kindness of the publishers specimens of the illustrations are inserted in this notice.

H. T.

Botanical News.

ARTICLES IN JOURNALS.—MARCH.

Grevillea.—M. C. Cooke, "British Fungi" (contd.).—W. A. Leighton, "Notes on Hellbom's Lichens of Lule Lapmark" (contd.).—

W. G. Smith, "New Ascomycetous Fungi" (*Mitrula alba*, *Peziza (Aleuria) Isabella*, *P. (A.) undata*) (tab. 9 and 10).—M. C. Cooke, "A Parasite on *Peziza*."

Hedwigia.—Venturi, "On *Orthotrichum*" (contd.).

Botanische Zeitung.—P. Sorauer, "Influence of Irrigation on Cultivation of Barley."—P. Ascherson, "*Tunica Saxifraga* in Silesia."—A. W. Eichler, "On the Structure of the Flower of *Canna*" (tab. 2).

Flora.—W. Velten, "Movements and Structure of Protoplasm" (contd.).—E. Warming, "Review of Danish Botanical Literature."—H. Wawra, "Notes on Flora of Hawai Islands" (*Pelea Waialealæ*, n.s., *P. Hawaiensis*, n.s., *P. Kaalæ*, n.s.).—A. Engler, "Notes on S. American *Olacineæ* and *Icacineæ*."

Oesterr. Bot. Zeitschrift.—A. Kerner, "The Hybrid Yarrows of the Alps (*Achillea Thomasiana*, *A. helvetica*, *A. Vallesiaca*, *A. Dumasiana*, *A. montana*, *A. impunctata*, *A. Laggeri*, *A. hybrida*, *A. Morisiana*).—J. Pantocsek, "Plantæ nov. ann. 1872 Hercegovinam et Montenegro coll." (*Viola speciosa*, n.s., *Vicia serrata*, n.s., *Pinguicula læta*, n.s.).—A. Rehmann, "Diagnoses of the Known *Hieracia* of Galicia and Bukowina"—E. von Halácsy, "New Localities for Lower Austrian Flora."—H. Wawra, "Sketches of the Voyage of the *Donau*" (contd.).—R. von Uechtritz, "Notes on Knapp's Pfl. Galiziens" (contd.).

Journ. Linnean Soc., no. 69 (March 21st).—J. G. Baker, "Revision of the Genera and Species of *Scilleæ* and *Chlorogaleæ*" (contd.).—W. Mitten, "New Species of *Musci* coll. in Ceylon by Dr. Thwaites" (plate 5).—W. A. Leighton, "On Two New Species of the Genus *Mycoporium*, Flotow" (pl. 6).—W. Thiselton-Dyer, "On the Determination of Three Imperfectly Known Species of Indian *Ternstroemiaceæ*."—F. Currey, "On a New Genus of the Order *Mucedines*" (pl. 7).

New Books.—G. Bentham and J. D. Hooker, "Genera Plantarum, part iv., *Caprifoliaceæ* to *Compositæ*" (Reeve and Co., 24s.).—Le Maout and Decaisne, "A General System of Botany"; translated by Mrs. Hooker, edited by J. D. Hooker (Longmans and Co., 52s. 6d.).—G. Henderson and A. O. Hume, "Lahore to Yarkand" (Reeve and Co., 42s.).—J. B. Verlot, "Catalogue Raisonné des pl. vasc. du Dauphiné" (Grenoble, 10s.).—A. Pansch, T. Buchenau, W. O. Focke, &c., "Die zweite Deutsche Nordpolarfahrt in den J. 1869 u. 1870. Botanik," (Bremen).

The 2nd part of vol. i. of the new series of the "Nederlandsch Kruidkundig Archief" contains a list of Fungi recently discovered in Holland by Prof. Oudemans, a paper on the geographical distribution of *Stratiotes aloides* by H. de Vries, and numerous notes and localities bearing on the Dutch Flora.

Dir. Hermann Müller, of Lippstadt, has published the results of his investigations on insect-fertilisation of plants, under the title "Die Befruchtung der Blumen durch Moekten und die gegenseitigen Anpassungen Beider."

The "Abhandlungen der Naturforsch. Ges. zu Halle" contains a monograph of the *Centrolepidaceæ*, by Herr Hieronymus.

In the 2nd part of vol. xli. of the Journal of the Asiatic Society of Bengal, Mr. S. Kurz has published descriptions of 105 new plants

from Barma, Pegu, Tenasserim, and the Andamans. Three are *Compositæ*, and the remainder belong to the orders which are in English descriptive works placed before that group. Two new genera are described—*Apteron* (*Rhamnææ*) and *Zollingeria* (*Sapindacææ*). Part 2 is in the press. Further particulars of these plants will be given in the author's forthcoming "Contributions towards a Knowledge of the Barmese Flora."

A translated abstract of Hildebrand's paper on the fertilisation of Grasses appears in the "Gardener's Chronicle" for March 15 and 22.

In reference to the announcement made in our number for December last of a projected English translation of Sachs' "Lehrbuch der Botanik," we are enabled to state that the translation will be made from the 3rd edition, which has just been published in Germany, and contains a large amount of new matter. The publishers will be the Clarendon Press of Oxford, who have secured the use of reproductions from the 460 woodcuts with which the original work is illustrated. The translation has been entrusted to Mr. A. W. Bennett, who will also annotate the English edition, and will be assisted in this by Prof. Thiselton-Dyer. It is expected to be ready by about the end of the year.

Mr. S. Kurz's report on the flora and forests of Pegu is in the press, and will be shortly published by the Indian Government.

Mr. C. B. Plowright, of King's Lynn, proposes to issue, under the title of *Sphæriacei Britannici*, a few sets of 100 specimens of British Sphærias. The price of each set will be £1.

M. E. Cosson has been elected a member of the Académie des Sciences.

Mr E. M. Holmes, Curator of the Pharmaceutical Society's Museum, has been appointed lecturer on Botany at the Westminster Hospital.

By the death from pneumonia of Dr. John Torrey, on March 10th, the United States lose the oldest and one of the most eminent botanists in the country. Born at New York in 1796, he resided constantly in that city, where, besides holding several public appointments, he practised as a physician. He took his degree in 1818, and in the following year published a catalogue of the plants growing in the neighbourhood of New York. This was followed in 1824 by the first volume of the "Flora of the Northern and Middle Sections of the United States," and since that date Dr. Torrey has been perhaps the foremost botanist in opening up the floras of new districts of North America. Many of his papers are in Reports and Transactions; his "Flora of the State of New York" (1843), and the unfinished "Flora of North America," written in conjunction with Dr. A. Gray, are works of great importance. Besides his botanical fame, he was also distinguished as a chemist, and at the time of his death held the office of Superintendent of the Government Assay Office. Some years ago he presented his vast herbarium and library to the Columbia College of New York. Dr. Torrey's name is commemorated in the Coniferous genus *Torreyia* of Walker Amott.

The death is announced, on March 13th, at Vienna, of J. G. Beer, at the age of sixty-nine. He was the author of papers and monographs on the *Bromeliacææ* and other Monocotyledons.

We have received a circular proposing the formation of a society,

under the somewhat uncouth title of the "Botanical Locality Record Club," the objects of which are to be the verification and re-record, or expunging, of all old stations for rare plants, the publication of an annual record of the exact localities, and the formation of a herbarium. Members are desired, three or four in each county, who will assist to carry out these objects in their respective districts by sending specimens to Dr. F. A. Lees, of Hartlepool, who after authentication will forward them to Mr. T. B. Blow, of Welwyn, Herts, who will act as keeper of the herbarium. A subscription of five shillings is required to defray publishing expenses. It appears to us that the objects aimed at by the proposed organisation, so far as they are desirable, are already sufficiently accomplished by the existing machinery provided by the Botanical Exchange Club—which has the advantage of Dr. Boswell-Syme as curator—Mr. H. C. Watson's series of invaluable works, the numerous county Floras, and the pages of this and other journals; whilst the public herbarium of British plants in the British Museum is being constantly kept up, and forms a history of local botany extending over a long period. With reference to the extinction of species, it is not *per se* a matter of much importance whether a given plant has or has not been destroyed in a given spot, unless the causes of its destruction are carefully investigated; over and over again have plants pronounced by some too hasty collector to be "extinct" been "rediscovered" by a more practised or fortunate botanist. Though it is probably a rare event for a species to be exterminated by the direct action of rarity-hunters, yet the publication in so wholesale a manner as proposed of the "exact localities of all the rarer British plants" is likely in some instances to lead to such a result, in which case the Record Club might unhappily find itself obliged to "expunge" more stations than are ever likely to be destroyed by the more indirect operation of ordinary causes. We trust that in the interest of British Botany the promoters of the scheme will reconsider its plan, and if need be direct their energies into some channel—such as an inquiry into the causes of extinction, the action of drainage, of railways, cultivation, &c., on our flora—which would be at once of greater use to science, and less likely to do harm.

Botanical Prizes.—The Botanical Society of Edinburgh offers a prize of ten guineas for the best and approved essay on the reproduction of *Lycopodiaceæ*, to be competed for by students who have attended the Botanical Class at the Royal Botanic Garden, Edinburgh, during at least one of the three years preceding the award, and has gained honours in the class examinations. The author is expected to give results of practical observations and experiments made by himself on the subject, illustrated by microscopical specimens. The essay and specimens to be given in on or before 1st May, 1876, with a sealed note containing the author's name, and a motto outside. Facilities will be given for carrying on observations and experiments at the Royal Botanic Garden, Edinburgh.—A prize of ten guineas is offered, through the Council of the Botanical Society, by Charles Jenner, Esq., for the best and approved essay on the structure and reproduction of the Frondose and Foliaceous *Jungermanniaceæ*. This prize is subject to all the conditions specified in the case of No. 1.

Original Articles.

ON PHYSOTRICHIA, A NEW GENUS OF UMBELLIFERÆ FROM ANGOLA.

By W. P. HIERN, M.A.

(TAB. 132.)

PHYSOTRICHIA, *Hiern*.—Calycis dentes acuti, subelongato-subulati, quidpiam inæquales, erectiusculi, in fructu vix vel parum aucti, persistentes. Petala obcordata ob lacinulam inflexam, uninervia, non radiantia, albida, glabra. Stylopodia crassa, sublobulata; stigmata magna, atropurpurea. Fructus ellipsoideo-oblongus, subteres, commissura lata; carpella facie subplana; jugæ primaria prominentia, obtusa, subæqualia, papillis densis cylindricis vesiculatim turgidis munita; jugæ secundaria 0; vittæ ad valleculeas solitariae (vel ad valleculeas laterales geminae?). Carpophorum bipartitum. Semen facie concavum.

Herba perennis, rigida, erecta, subglabra. Folia radicalia, duriuscula, ternatim vel pinnatim composita; foliolis ovalibus vel ovatis, simplicibus vel sublobatis vel trifoliolatis. Umbellæ compositæ, pluriradiatæ. Involucri et involucellorum bracteæ ∞ ; submembranaceæ.

P. WELWITSCHII, *Hiern*, species unica.

HABITAT in Angola, Prov. Pungo Andongo; in dumetis apricis sabulosis ad sinistram fluminis Cuize inter Quibinda et Banza de Quitage. *Dr. Welwitsch!* Iter Angolense, No. 2512.

Plant 2—3 feet high, rather aromatic, drying brown. Root-stock thick, with several stems, branched below the surface of the ground. Flowering stems scape-like, glabrous, undivided and naked below, minutely pubescent and slightly branched above. Leaves radical, mostly trifoliolate, nearly glabrous, suberect, $4\frac{1}{2}$ —16 inches long; leaflets simple or again trifoliolate, oval or ovate, sessile or the terminal one petiolate; obtuse or apiculate at the apex, narrowed towards the base; coarsely serrate-dentate, rather fleshy and almost coriaceous, $1\frac{1}{2}$ — $2\frac{1}{2}$ inches long by $\frac{1}{2}$ —1 inch wide; primary petioles 3—12 inches long. Umbels 1—2 inches in diameter; primary and secondary rays 6—15; bracts of the involucre and involucels numerous, linear-subulate. Fruit about $\frac{1}{8}$ inch long by $\frac{1}{10}$ inch thick.

The compound umbels, the solitary vittæ situated in the intervals of the subequal and not winged primary ridges which alone are present; and the nearly terete fruit with a wide commissure, readily place the plant in the neighbourhood of *Seseli*, to which genus its affinity is closest, and from which it is separated by the distinct character of the armature of the fruit (from which the name is taken), associated with a peculiar habit and foliage. There is no other genus representative

of the tribe *Seselineæ* in Angola; and *Diplolophium*, which occurs in Abyssinia and in Batoka Country, is the only one throughout the whole of Tropical Africa.

DESCRIPTION OF TAB. 132.—*Physotrichia Welwitschii*, Hiern, from specimens collected in Angola by the late Dr. Welwitsch. Fig. 1, Flower $\times 6$. 2, Umbel of ripe fruit. 3, A single ripe fruit $\times 4$. 4, Section of fruit $\times 12$.

ON SOME POINTS RELATING TO THE MORPHOLOGY OF CAREX AND OTHER MONOCOTYLEDONS.

BY FRED. TOWNSEND, M.A.

IN many families of the Monocotyledons, *e.g.*, in *Aroideæ*, *Irideæ*, *Restiaceæ*, *Juncaceæ*, *Desvauxiaceæ*, *Hydrocharideæ*, &c., the presence of one bract, or more usually of two, at the branching of the stem, indicates the commencement of an inflorescence, and indeed it may be assumed that in these families the stem which bears the inflorescence is the first axis of the latter, and all its branches are branches of the inflorescence.

Where there is a branching of the axis the normal position of the second bract is on the secondary axis, alternate with and opposite to the first bract, which represents the leaf in the axil of which the branch springs; but when to all appearance there is no branching of the axis, the second bract is situate a little higher than the first.

At the base of any branch of the inflorescence in *Cyperus*, *Carex*, *Scirpus*, *Cladium*, *Luzula*, &c., will be found the second bract spoken of above. In *Carex* the first bract is usually foliaceous, but the second is frequently membranous and sheathing, and has been designated "ochrea"* by Duval Jouve, who has proposed the presence or non-presence of this bract as a character by which to separate the genus into two groups. This second bract is, however, very varied in form and in size, and is present frequently as a single bract, and is therefore not recognised as correlative to that of the sheathing form. In *Carex depauperata*, *digitata*, *lævigata*, *ædipostyla*, &c., this bract is sheathing, very long, slender, membranous, and nerveless, and is often represented by a sheath of so great delicacy and fitting so close to the stem that it may easily

* Hardly a good term here, since it usually signifies the appendage to a leaf, whereas the sheath in *Carex* is itself a modified leaf or bract. The sheathing bract in *Carex* is probably of a similar nature to the ochrea in *Polygonum*, and if this be so the tracing of this organ through Monocotyledons to Dicotyledons becomes exceedingly interesting. Schleiden in his "Principles of Scientific Botany," English ed., p. 271, complaining of the loose terminology of botanists, illustrates his remarks thus:—"Here (*e.g.*, in *Pothos*) it not unfrequently occurs that the leaves are developed quite differently, alternating regularly; one consisting of lamina, petiole, vaginal portion, and stipular sheath; the succeeding one appearing as a mere membranous sheath, which is neither stipular sheath nor a vaginal portion, but an exceedingly aberrant form of the whole leaf," &c. The membranous sheath here spoken of exactly corresponds to that of *Carex*, &c.

escape observation. It is very short in *Carex glauca*, *paniculata*, *rigida*, *pendula*, *montana*, *remota*, &c. In *Carex glauca* it becomes firmer in texture, and frequently possesses nerves, and by studying this plant alone the true nature of the utriculus may be learnt,* for if a sufficient number of specimens be examined the passage of the second bract from an ochreous-like sheath to the urceolate two-nerved utriculus may be gradually traced.

I have said that the normal position of the second bract is at the very base of the branch, on which it represents its first leaf; but frequently it has its origin higher up the branch, and it then begins to assume the form of the true utriculus, becoming more urceolate, being furnished with two prominent lateral veins which frequently extend beyond the lamina of the bract, which thus becomes bidentate, a form which the utriculus takes more or less in so many species; and when this second bract has its insertion thus higher it frequently bears in its axil an ovary usually more or less imperfect.

The normal form of the female flower of *Carex* consists of an outer bract, apparently within the axil of which is the fruit, consisting of utriculus and nut; but this outer bract is never present, if the axillary sheathing bract rises from its normal position and has its insertion higher up on the axis; in this case the outer and usually foliaceous bract at the base of the spike is correlative to the smaller bract always present in front of the utriculus, and the axillary sheathing bract itself takes more or less the form of the utriculus, and bears in its axil a more or less imperfect nut.

Now if we suppose that the growth of the stalk which bears the female spike (of, say, *Carex glauca*) be arrested, we should have, first, the foliaceous bract situate on the main axis; secondly, the arrested axis; thirdly, the axillary bract, or so-called ochrea; fourthly, the ovary (often present, as I have observed above), which several organs are in their character and position exactly those of every female flower of *Carex*; and that this is the true nature of the flowers can be made evident.

It is now many years since I first observed a swelling at the base of and within the utriculus of several species of *Carex*. It is situate in front of the ovary, but it is often so minute as to be with difficulty observed, and its presence is only indicated by a raised portion of the tissue. This growth may be well seen in *Carex riparia*, *pseudo-Cyperus*, and *glauca*, and in *glauca* and *pseudo-Cyperus* it very frequently becomes nascent in the form of a branch which in its growth forces its way through the mouth of the utriculus, and becomes the axis on which are situate several flowers, each of the female ones furnished with outer bract, utriculus, ovary, and in front of the latter the peculiar growth alluded to above. Under this view the spike of female flowers becomes compound and its inflorescence indeterminate.

The nature of the seta (usually so termed) in *Carex microglochin*, *setifolia*, &c., and in all species of the genus *Uncinia*, is similarly

* The transformation may also be well traced in *Carex riparia*, where at the base of, I believe, every male spike will be found a fertile flower, with an open glume or utriculus next the main axis, alternate with and opposite to the outer bract.

explained as the prolongation or continuation of a secondary axis, and in all these instances the latter takes the form of a seta. But one of the most remarkable forms of the secondary axis within the utriculus is that which occurs in *Carex ædipostyla*, Duval Jouve (*C. ambigua*, Link.), and which must have escaped the notice of that most careful observer, for he does not describe or allude to it in his elaborate paper on the plant given in the Bulletin de la Soc. Bot. de France in 1871, and I believe it has hitherto escaped the observation of all botanists. In this instance the secondary axis exists as a delicate, flattened, linear-oblong, smooth, bract-like scale, with one central slightly excurrent nerve. The position of this axis is similar to that in other species of the genus, but it lies closely adpressed to the nut, than which it is both narrower and shorter, and therefore easily escapes observation. I conceive the axis to be represented by the central nerve, and the lamina on each side of this to be of a similar nature to the wing-like process which exists in the main axis of the inflorescence, and which is peculiar to this species, though something similar occurs in several Grasses.

The structure of the genera *Elyna* and *Kobresia* most remarkably and satisfactorily supports the present view of the nature of the seta. In *Elyna* the inflorescence is reduced apparently to a simple spike: the outer bract (bract of the primary axis) is amplexicaul, and envelopes the axillary bract (first bract or leaf of the secondary axis), which is opposite and alternate to the outer bract. In the axil of the last is the ovary, and in front of this the secondary axis, continued and bearing at its apex a second bract (alternate with and opposite to the axillary bract), within the axil of which are produced the three stamens in one row. In *Kobresia* the spike is compound, but there is a similar structure of the female flowers, though the axillary growth rarely bears stamens. The upper bracts bear stamens only, as in the genus *Carex*. The flower of *Elyna* is therefore really monœcious, consisting of a lower female flower and an upper male, and is an early example of a monœcious assuming the form of an androgynous flower. It is very remarkable that no instance that I am aware of is known in *Carex*, *Uncinia*, or *Elyna* of a male flower supported by two alternate and opposite bracts like the female flowers.

If the above reasoning be considered conclusive as regards the position of the several parts of the flowers of *Carex*, the single nature of the utriculus, or of the bract which forms it, naturally follows; but an examination of the sheathing bract on the secondary axis of different species of *Carex*, *Uncinia*, of *Scirpus*, *Luzula*, *Juncus*, &c., and of the correlative parts in *Elyna*, *Kobresia*, &c., will place the question beyond a doubt. These conclusions are further remarkably borne out by the presence of the axillary bracts in some genera of the order Gramineæ, e.g., in *Crypsis aculeata* and *Andropogon pubescens*. In these Grasses the branches of the inflorescence, at their insertion, are furnished with a bifid, clasping, two-nerved bract; in *Andropogon pubescens* only the primary branches are furnished with precisely similar bracts. No doubt can for a moment be entertained as to the single nature of the bracts in these instances, for the position of each bract is invariably alternate and opposite to the leaf below, from the axil of which the branch springs,

and to the sheathing bract above, which is the second bract on the same axis. Kunth seems to have been led to consider the utriculus of *Carex* as consisting of one bract, and to recognise its position on a secondary axis, by examination of the frequent development of the latter in some species of *Carex* and in *Uncinia*; but I do not find that he understood the whole nature of the inflorescence as attempted to be explained above. Robert Brown held a different view, as do many botanists of the present day; but if the foregoing reasoning be correct the single nature of the utriculus necessarily follows. I hope on a future occasion to show that the secondary axis of the inflorescence of *Carex* is entirely different from the seta contained within the spikelets of several Grasses; but that there is a great similarity in the construction of Grasses and Sedges, and that the correlative position of their parts leads to the conclusion that the two-nerved or keeled inner pales of Grasses are single floral bracts.

If such be the construction of the female flower of *Carex*, what is that of the male flower? Here there is uniformly but one outer bract, in the axil of which the stamens are situate, without the presence of any axillary or subtending bract. It seems unlikely that the construction should be on a different plan in the two flowers; but I know no instance in which there exists, in the barren spike, a male flower with subtending bract, or any evidence of the suppression of a secondary axis. I think it very probable that, as in *Lolium* and other genera of Gramineæ, the inner bract is suppressed, its presence not being necessary as a protection to the stamens as it is to the ovary or nut of *Carex*. This view would appear to be borne out by the instances recorded by Robert Brown and others of the utriculus containing stamens instead of an ovary.*

In the lower flowers of the male spike of *Carex* the stamens are placed side by side, and it is only in the very uppermost flowers that there is any appearance of their being placed in a triangle. Their collateral position may be due to pressure, but it also suggests the probability of their being mere branches of a single organ, but I by no means insist on this view.

As regards the structure of other genera of the order Cyperaceæ, there exist much greater difficulties in coming to a right conclusion respecting it. If the stamens in such genera as *Scirpus*, *Eleocharis*, *Eriophorum*, &c., be considered as consisting of one or more floral whorls, the structure would be so different as to necessitate the removal of *Carex* from the order; whilst on the other hand we must first be certain that we interpret rightly the construction of these genera, and I feel that I have not studied the extra-European species sufficiently to arrive at satisfactory conclusions. I have long considered the hypogynous bristles surrounding the germen as the modification of one or more floral bracts, and the intimate division of the parts of this whorl in *Eriophorum*, *Typha*, &c., to be of a similar nature; the hairs in *Erianthus Ravennæ* and in *Imperata* are an evident modifi-

* Prod. Flor. Nov. Holl., p. 242. This and other instances are mentioned in "Vegetable Teratology," by Maxwell T. Masters, M.D., F.R.S., p. 199. Dr. Masters also, at page 143 of the same work, records the occurrence of axillary proliferation in *Carex*, observed by M. Wesmael and by Mr. Wigand.—[See p. 24 of this volume.]

cation of a bract; again the ligula of some Grasses, as *Spartina versicolor*, is represented by a row of hairs; so that a single amplexicaul bract may be represented by an intimate division of its parts, the divisions springing from the very point of insertion, and it is possible to consider that a single bract should be represented by a whorl of bristles, and such is probably the case with the bristles present at the base of the florets of several Grasses. Let us for a moment consider the stamens in some of the genera last mentioned also as a modified whorled single bract; yet the position of the germen would not be that of *Carex*, for the stamens are in that genus situate on the secondary axis, and cannot surround the ovary.

PROBABILITY OF THE OCCURRENCE OF *CHENOLEA HIRSUTA* IN GREAT BRITAIN.

BY BARON FERD. VON MUELLER, C.M.G., M.D., F.R.S.

Not many months ago I expressed surprise to a great writer on British plants that as yet *Juncus pygmaeus* of Richard had not been found in any of the British Islands. It was thus with particular interest that I soon afterwards noticed in the number of the "Journal of Botany" for November, 1872, that this very characteristic plant had just been discovered on the mainland opposite the Scilly Islands by Mr. W. H. Beeby. In the year 1846 I collected *J. pygmaeus* on the Island of Sytt, off the west coast of Schleswig, in spots precisely similar to those in which in Jersey and Guernsey *J. capitatus* is found. Indeed in Sytt the latter occurs in company with *J. pygmaeus*, though it is by far the more gregarious of the two. The occurrence therefore of *J. pygmaeus* in the Channel Islands may now be anticipated, and we may look forward to its discovery also on the sandy coasts of Ireland. To Professor. E. F. Nolte, of Kiel, is due the credit of having discovered, so long back as 1825 ("Novitiæ Floræ Holsaticæ," p. 39), this very rare species in Northern Europe.

The remembrance of Prof. Nolte's researches on the coast both of the Baltic and North Seas brings me to another rare plant, for which a search should be instituted along the British coasts. I allude to *Chenolea hirsuta* (*Kochia hirsuta*, Nolte, Novit. Flor. Holsat., p. 24—27; *Echinopsilon hirsutum*, Moq., in Ann. des Sciences Nat., sér. ii., vol. ii., p. 217).

By its extreme external similarity to *Suaeda maritima* the *Chenolea* must have managed to have hitherto in England avoided recognition; but if once recognised this plant will doubtless be discriminated with ease among the far more widely-distributed *Suaeda*, intermixed with which it occurs. There is at tab. 187 of the "Flora Danica," issued in 1765, a fair figure of the downy form, and Prof. Nolte has lucidly demonstrated its synonymy. The embryo, horseshoe-shaped in *Chenolea* and circinate in *Suaeda*, affords an unerring mark of distinction in cases where the pubescence of *Chenolea hirsuta* has become lost, or rather reduced to a slight beard in the axils. Moreover the *Chenolea* has

a tendency to twist its fruit-bearing branches in a spiral manner, by which means the plant becomes apparent, even at a distance, as very different from *Suaeda maritima*. Sometimes there is no trace of pubescence, when distinction at a glance is more difficult before the fruits are developed; the latter, however, with their short angular or even horn-like expansions, are very characteristic. A close search among dried plants of *Suaeda maritima* in British collections would probably demonstrate the existence of *Chenolea hirsuta* without any special investigation along the shores for the purpose.

But another question was raised by Nolte nearly half a century ago, whether more than one species passes as Linné's *Salsola hirsuta*—that is, whether the Mediterranean *Chenopodium hirsutum* of the first edition of the "Species Plantarum" is really the same as the Northern plant included under *Salsola hirsuta* in the second edition. This might readily be ascertained in London from an inspection of the original specimens in the Linnean collection. Prof. Nolte thought the Southern plant distinct; if so it may possibly belong to *Chenolea sedoides* (*Kochia sedoides*, Schrader Journ. 1809, 86). In such a case it would be best to retain the specific names as they stand, not only because they have been in use for such a long time, but also because no change could now tend to any real advantage, but would render the confused synonymy of these plants still more perplexing. The indument of *Chenolea sedoides* is much denser, the flowers are more copious, and generally more than one are developed in each axil, while the spiral twisting of the fruit branches seems never to occur, and the lobes of the old calyx are always narrower and more pointed. Besides, the flowers of *Chenolea hirsuta* are larger and almost constantly solitary; indeed the habit of the two plants is very different, so much so that *Chenolea hirsuta* far more resembles *Suaeda maritima* in external appearance than its own closely allied congener. Should, however, Linné's first plant be different as well from *Chenolea sedoides* as from the Northern *Chenolea hirsuta*, then the name of the latter might be changed to *Chenolea villosa*, inasmuch as Peter Kylling's *Kali minus villosum* (Viridar. Danic., p. 77, anno 1688), on the authority of Prof. Nolte, is referable to his *Kochia hirsuta*. Perhaps the specific name has tended much to prevent the recognition of the Northern plant, it being, as already observed, frequently glabrous.

LYSIMACHIAM NOVAM CHINENSEM.

PROPOSIT H. F. HANCE, PH.D.

918 *LYSIMACHIA* (*LYSIMASTRUM*) *CHRISTINÆ*, *n.sp.*—Glaberrima, caulis prostrato longe repente ad nodos radicante, foliis oppositis petiolo laminæ plerumque æquilongo nixis ovatis obtusis basi cordatis vel rotundatis subtus pallidis lineolis minutis glandulosis nigris crebris conspersis, pedunculis axillaribus solitariis folio circiter æquilongis, calycis laciniis lineari-oblongis obtusis corolla subduplo brevioribus, corollæ aureæ diametro $\frac{3}{4}$ -pollicaris lobis oblongis obtusis cum sepalis lineolis nigris crebre notatis, staminum 5 duas tertias corollæ longitu-

dinis attingentium filamentis sparse glanduloso-pilosis ad medium usque in tubum cylindraceum edenticulatum coalitis, stylo glabro stamina paulo superante, stigmatibus parvo capitato.

In montosis ditionis Ningpoensis, vere a. 1872, obvenit dominæ Swinhoe, cui sacravi. (Exsicc. n. 17673.)

Nostrati *L. Nummularia*, Linn. admodum affinis, et aspectu quidem simillima; egregie vero differt foliis longe petiolatis ovatis v. cordato-ovatis, laciniarum calycinarum forma, lobis corollinis multo angustioribus magis glanduloso-punctatis, staminibus altius connatis.

ON A CHINESE MAPLE.

By H. F. HANCE, PH.D., &c.

In a small collection of plants gathered in the hilly region around Ningpo by Mr. R. Swinhoe during the spring of 1872, I found specimens of a Maple which, though probably referable to Thunberg's *Acer trifidum*, yet differs sufficiently from the Japanese plant to render it desirable to characterise it as a distinct variety.

Acer trifidum, Thunb., var. *ningpoense*, mihi: innovationibus (etiam fructu jam maturo) densissime cinereo-pannosis, foliis adultis subtus glaucissimis secus nervos pilosis, samaris angulo circiter 55° divergentibus nucularum marginibus inferioribus cum pedicello angulum rectum efformantibus alis semitrapeziformibus nempe infra medium latioribus inde utrinque sensim cuneato-angustatis apice rotundatis marginibus sibi haud invicem impositis.

Obs.—In forma typica japonensi innovationes prima juventute tantum pilosæ; folia matura glaucedinis fere omnino expertia; samaræ erectæ, angulum 8° — 10° ad summum includentes, nucularum margines inferiores inter se angulo circiter 120° divaricati; alæ semi-oblongæ, a basi scilicet apicem rotundatum versus sensim latiores, marginibus arcte se invicem obtegentes.

The dense felting of the branchlets, the extreme glaucescence of the foliage, and the marked difference in the fruit give this a very distinct appearance; but, though the two forms seem as well characterised as *A. Mono*, Maxim., and *A. truncatum*, Bge., I do not think they are specifically separable. According to C. Koch,* Siebold believes Thunberg's species to have been introduced into Japan from China, and it is mentioned with doubt by Hooker and Arnott† as growing near Canton or Macao; but I have not until now seen any Chinese specimens. It has the closest affinity with the Lebanon *A. syriacum*, Boiss. & Gaill.; a relationship not adverted to by the distinguished botanist who established that species,‡ nor, so far as I am aware, by any other writer. Except the firmer and more coriaceous leaves, and the somewhat larger fruit, with a less prominent and blunter pro-

* In Miquel Ann. Mus. bot. Lugd.-Bat. i., 251.

† Bot. Beechey's Voy., 173. Can *Liquidambar* have been mistaken for this? The Chinese name for that tree is rendered *Sycamore* in Medhurst's Dictionary?

‡ Boissier Diagn. pl. orient., ser. 2, v., 72; Fl. orient. i., 352.

tubercle on the nucule, I see nothing to separate the two. The Syrian species has the fruit-wing in shape like that of the typical *A. trifidum*, though less narrowed at the base; but in the divergence of the samaræ, and the straight line formed by the base or lower margin of the nucule, it agrees with my variety, and I doubt if it possesses a higher claim to autonomy.

We have here a fresh illustration of the singular and unexpected connection between the arboreous and frutescent vegetation of North-Eastern China and the conterminous regions of Manchuria, on the one hand, and the widely-separated West Asiatic or South European countries lying between and around the Mediterranean, Black, and Caspian Seas, on the other; a very remarkable geographico-botanical phenomenon well worthy of the most attentive study and consideration. It is not my intention to enter here into an examination or discussion of this curious fact; but the following brief list, from which trees and shrubs generally distributed throughout the Northern temperate zone are purposely excluded, and which is, indeed, expressly restricted to closely representative or even identical species, exhibits several instances of very intimate relationship. The first column contains the North Chinese or Manchurian species; the second their West Asiatic or South European kindred. I have added a few elucidatory notes, numbered to correspond with the list.

- | | |
|---|--|
| 1. <i>Tilia mandshurica</i> , Rupr.
& Maxim. | <i>Tilia argentea</i> , Desf. |
| 2. <i>Rhus Cotinus</i> , Linn. | <i>Rhus Cotinus</i> , Linn. |
| 3. <i>Pistacia chinensis</i> , Bge. | <i>Pistacia palæstina</i> , Boiss. |
| 4. <i>Acer Mono</i> , Maxim. | } <i>Acer lætum</i> , C.A.M. |
| 5. <i>Acer truncatum</i> , Bge. | |
| 6. <i>Acer trifidum</i> , Thunb. | <i>Acer syriacum</i> , Boiss & Gaill. |
| 7. <i>Cratægus pinnatifida</i> , Bge. | <i>Cratægus monogyna</i> , Jacq. |
| 8. <i>Liquidambar formosana</i> ,
Hance. | <i>Liquidambar orientalis</i> , Mill. |
| 9. <i>Fraxinus Bungeana</i> , DC. | <i>Fraxinus Ornus</i> , Linn. |
| 10. <i>Fraxinus rhynchophylla</i> ,
Hance. | <i>Fraxinus oxyphylla</i> , Bieb. |
| 11. <i>Diospyros Lotus</i> , Linn. | <i>Diospyros Lotus</i> , Linn. |
| 12. <i>Planera Davidii</i> , Hance. | <i>Planera Richardi</i> , Mx. |
| 13. <i>Ulmus macrocarpa</i> , Hance. | <i>Ulmus pedunculata</i> , Fong. |
| 14. <i>Quercus Fabri</i> , Hance. | } <i>Quercus sessiliflora</i> , Sm., et aff. |
| 15. <i>Quercus mongolica</i> , Fisch. | |
| 16. <i>Quercus aliena</i> , Bl. | } <i>Quercus Cerris</i> , Linn. |
| 17. <i>Quercus dentata</i> , Thunb. | |
| 18. <i>Quercus chinensis</i> , Bge. | <i>Quercus Libani</i> , Oliv. |
| 19. <i>Quercus serrata</i> , Thunb. | <i>Quercus castaneifolia</i> , C.A.M. |
| 20. <i>Carpinus Turczaninovi</i> ,
Hance. | <i>Carpinus duinensis</i> , Scop. |
| 21. <i>Pterocarya stenoptera</i> , Cas.
DC. | <i>Pterocarya caucasica</i> , Kth. |

1. The Amur species is unhesitatingly reduced to *T. argentea* by Regel.*

3. Mr. Hanbury writes me that in his opinion *P. atlantica*, Desf., *P. palestina*, Boiss., and *P. cabulica*, Stocks, are neither of them specifically distinct from *P. Terebinthus*, Linn. If this be so, doubtless the North Chinese tree must be added to the list.

4, 5. When describing the Japanese Maples in Siebold's collections, Zuccarini observed* that *A. truncatum* and *A. lætum*, both of which he had compared, scarcely differ from *A. pictum*, Thunb. On the discovery of *A. Mono*, the late Dr. Ruprecht remarked† on its affinity with *A. truncatum* and *A. cultratum*, Wall.; and he subsequently‡ (although possessing but imperfect materials for comparison) regarded *A. truncatum*, *A. lætum*, and *A. Mono* as all different, but hesitated as to the identity of the latter with Siebold and Zuccarini's *A. pictum*, which he believed different from that of Thunberg. M. Maximowicz endeavoured§ to discriminate *A. lætum*, *A. truncatum*, and *A. Mono* by good characters, derived mainly from the fruit; and with the value and constancy of these Dr. Regel|| expresses himself fully satisfied. Prof. Carl Koch¶ reduces *A. cultratum*, *A. truncatum* and *A. lætum* to *A. pictum*, Thunb. (and of Zuccarini), and in this he is followed by Miquel.** Finally, Schmidt†† suspects *A. Mono* to be the same as *A. pictum*. I may observe that both occur in Japan.

7. Dr. Regel, in a recent "Revisio specierum generis *Cratægi*,"‡‡ reduces the Chinese plant to a variety of *C. Oxyacantha*, Linn., scarcely separable in his opinion from his variety *kyrtostyla*, which is the plant I, following the majority of European botanists—Koch, Bertoloni, Ledebour, Babington, Grenier and Godron, Fries, Boreau, Schlosser, J. D. Hooker, &c.—regard as identical with Jacquin's *C. monogyna*.§§ But I cannot believe that a tree which in its natural wild state produces a fruit an inch in length, and nearly as much in transverse diameter, enclosing five free nutlets, and with a very powerful and most persistent scent of apples, can be a mere form of our Hawthorn.¶¶ It is true that in a special memoir on a species belonging to a closely-

* Abhandl. d. math.-phys. Kl. d. k. baier. Akad. d. Wissensch. iv., 2., 157.

† Bullet. Acad. Petersb. xv., 416.

‡ Ejusd. op. xv., 523.

§ Prim. Fl. Amur. 68.

|| Tent. Fl. Ussur, 34.

¶ In Miquel Ann. Mus. bot. Lugd.-Bat. i., 251.

** Ejusd. op. ii., 87.

†† Fl. Sachalin, 120.

‡‡ "Memoirs of the Imp. Bot. Garden of St. Petersburg" (the title is in Russian) i., 118.

§§ On the two species or subspecies confounded under the name of *C. Oxyacantha*, and respecting which very conflicting opinions exist amongst botanists—*cfr.* Bertoloni Fl. Ital. v., 145—9; Moris Fl. Sardoia ii., 43; Grisebach Spicileg. Fl. Rumel. i., 89; Boreau Fl. du Centre de la France, ed. 3, ii., 234; Fries Summa veg. Scandinav., 174; v. Hausmann Fl. v. Tirol i., 287; Visiani Fl. Dalmat. iii., 244; Ruprecht Fl. Ingrica i., 349. Fuss (Fl. Transsilv. excurs., 211) has a *C. intermedia*, which he places between the two, and says is the commonest kind in Transylvania. It is impossible from his diagnosis to say to which it should be referred; but perhaps it is the hybrid plant recorded by Reichenbach (Fl. Germ. excurs., 629) under the name of *C. apifolia*, with the remark "Hæc ansam fecit confundendi."

¶¶ See my note on this species (Seem. Journ. Bot. viii., 313).

allied genus *M. Decaisne** has shown the prevalence of extraordinary variability in the volume and shape of the fruit, as well as in other characters; but it must be borne in mind that this refers to a fruit-tree cultivated from a very remote antiquity,† and of which a large number of varieties were already known to the Romans,‡ with whom pomology, so far as we can judge, had made but inconsiderable progress. No one since the publication of Mr. Darwin's great work on variation is ignorant of the "plasticity of the whole organisation"—to use his own words—of our domesticated productions. So far as known at present, *C. pinnatifida* only occurs in North China and Manchuria, for the plant found in the Alatau Mountains by Semenow, and referred hither by Regel and v. Herder,§ is now regarded by the former as a variety of *C. sanguinea*, Pall.

8. Both the species here named—most beautifully figured by Mr. Fitch—have been characterised afresh by Prof. Oliver,|| who has conclusively shown that my suspicion of the identity of the Chinese species with the North American *L. styraciflua*, Linn., is groundless. A most interesting notice of this tree, celebrated in Chinese literature under the name of *Fung*, has been given by Mr. T. Sampson.¶

9. Mr. Hanbury, who on examining young specimens of *F. Bungeana* had been impressed by its wonderful closeness to the Manna Ash of Europe, wrote to me on receiving a scrap with one or two samaræ of the Chinese plant:—"I can exactly match it from my specimens of *F. Ornus*, Linn."

12. Since describing the Chinese species,** I have received from my friend Dr. Bretschneider specimens with perfectly ripened fruit, though in all I have examined the seeds are unfortunately atrophied. It may be thus described:—Utriculus compressissimus, obliquus, 2½ lin. longus, loculo transverso, curvulo, obreniformi, hinc latere late alato, disci emarginaturæ faciebus internis stigmatosis; semen pendulum. In carpical structure it differs so much from its Caucasian, Cretan, and Japanese congeners—all of which I have examined—that it must form the type of a new subgenus at least, if not rather a genus, for which I propose the name of *Hemiptelea*.

14—16. *Q. mongolica* is very much like *Q. sessiliflora*, to which Pallas erroneously referred it. The *vexata quæstio* of the distinctness of our two commonest European Oaks has perhaps been settled by the

* "De la variabilité dans l'espèce du Poirier" (Ann. sc. nat., 4^e sér., xx., 188.

† "Die Birnbaum ist einer der ältesten Bewohner der Gärten" (Dierbach Fl. Mytholog., 100.)

‡ Pliny. (Hist. nat. xv., 16, 1.) enumerates by name thirty-eight different kinds of Pear; and Columella (De re rust. v., 10.) eighteen, besides others, "quorum enumeratio nunc longa est."

§ Enum. pl. in reg. cis- et transiliensibus a Semenovio coll., 102.

|| Hook. Icon. plant., 3rd ser., i., tt. 1019-20.

¶ "Notes and Queries on China and Japan" iii., 4. Another correspondent, at page 47 of the same volume, states that in the neighbourhood of Amoy, where the tree abounds, a large green caterpillar is found on it, from which a strong sort of gut is made by simply drawing out the entrails of the insect as far as possible.

** Seem. Journ. Bot. vi., 333.

late Prof. Oersted,* who asserts that the leaf-buds are alone sufficient to establish their specific difference.

17. I believe I am correct in my idea of the affinity of these two species. I have examined a Georgian specimen, collected by Szovits, of *Q. macranthera*, Fisch. & Mey., said by Blume† to be scarcely distinct from *Q. dentata* (= *Q. obovata*, Bge.!), and placed next it by A. De Candolle. The cupule and glans are quite different, and its relationship is certainly rather with the *Robores*. Both are omitted from the list of species given by Oersted. Young trees of *Q. dentata* have extremely large leaves; one now before me measures twenty-one inches in length. These leaves, as I learnt from Mr. Mayers, are a common object of traffic in the North of China, being brought in from Manchuria, and sold, at the rate of about a halfpenny per pound, for the purpose of wrapping up the flour dumplings so largely consumed by the natives.

18. Carl Koch regards *Q. Libani* and *Q. serrata*, Thunb., β . *Roxburghii*, A. DC., as identical.

19. Miquel‡ considers the Georgian tree as a "forma parum diversa" of Thunberg's species; but the two are placed by Oersted in different sections of his subgenus *Cerris*.

20. Mr. J. G. Baker believes my plant and that from Western Asia to be conspecific; an opinion in which I cannot concur.

21. The Chinese tree is the type of a new subgenus.

SHORT NOTES AND QUERIES.

CAREX MONTANA, Linn., IN DEVON.—I am much pleased at being able to report *Carex montana*, Linn., as a Devonian species; one which I think will be considered a very interesting addition to the flora of the county. On May 13th I discovered it in considerable quantity, and at three spots, on Bickleigh Down, a heathy piece of unbroken pasture-land several acres in extent, lying five miles to the north of Plymouth, on the right of the turnpike road as you go thence towards Tavistock. Now that my attention has become directed to this *Carex* I think it probable that I shall shortly be able to record it from other places in this neighbourhood, as we have much ground of very similar character to that of Bickleigh Down. It is associated with the species generally found on our commons—*Ulex europæus*, *U. Gallii*, *Erica cinerea*, *Polygala*, *Galium saxatile*, *Viola canina*, Linn., *V. lactea*, Sm., *Serratula*, *Agrostis setacea*, &c., &c., and with its allies *C. pilulifera* and *C. præcox*. At this season, the middle of May, it has already passed out of flower, and so is an earlier flowering plant than these two other species; *præcox* being now in full flower, and *pilulifera* having young fruit and flowers. Without minute examination its longer stems, very dark glumes, and large fruit serve to distinguish it from the latter, the species it resembles most; whilst

* "Aperçu sur la classification des Chênes," 6.

† Mus. bot. Lugd.-Bat. i., 298.

‡ Ann. Mus. bot. Lugd.-Bat. i., 105.

on the common the very light yellowish-green of its leaves contrasts strikingly with the dingy tints of much of the surrounding vegetation. It has been supposed to have a preference for limestone, but on Bickleigh Down occurs just where an elvan vein traverses slates of the Devonian series. The elevation is from 510 to 540 feet, so is considerably within the limit of Watson's Inferagrarian zone. Its occurrence in Devon considerably extends its area, as the only counties from which it has previously been recorded are Gloucester, Monmouth, Hereford, Worcester, and Sussex.—T. R. ARCHER BRIGGS.

FLORA OF BERKSHIRE (pp. 138—140).—The Rev. C. W. Penny informs me that the locality given for *Viola hirta* (p. 138) is in Surrey, and the Wellington College one for *Inula Pulicaria* (p. 139) in Hants.—JAMES BRITTEN.

PLANTS OF UNITED STATES AND EUROPE.—The following are the principal species or forms peculiar to the United States and Europe, excluding Arctic-alpine species:—*Anemone nemorosa*, of which there is a peculiar Pacific form perhaps reaching the eastern borders of Asia. *Myosurus minimus*, which may be a recently introduced plant. *Cakile*, a maritime genus. *Saxifraga aizoides*. *Bellis integrifolia*, which may be compared with the European *B. annua*. *Lobelia Dortmanna*. *Primula Mistassinica*. *Centunculus lanceolatus*, a mere form of *C. minimus*. *Hottonia inflata*, which represents *H. palustris*. *Utricularia minor*. *Salicornia virginica*, the *S. mucronata* of Bigelow, and probably of Lagasca also. *Corema Conradi*, representing the Portuguese *C. alba*. *Vallisneria spiralis*, which appears to be absent from Northern Asia. *Spiranthes Romanzoviana*, with its single station on the Irish coast; it extends across the American continent well northward, but seemingly not into the adjacent parts of Asia. *Eriocaulon septangulare*, restricted in the Old World to a few stations on West British coasts. *Carex extensa*, *C. flacca* (or *Barratii*), and one or two others. *Cinna arundinacea*, var. *pendula*. *Leersia oryzoides*. *Spartina stricta* and *S. juncea*. *Equisetum Telmateia*. *Lycopodium inundatum*. *Calluna vulgaris*, which holds as small and precarious a tenure on this continent as *Spiranthes Romanzoviana* does in Europe.—Barely two dozen; and three or four of these are more or less maritime. Only two or three of them extend west of the Mississippi valley. *Narthecium* is not in the list, a form or near ally of the European and Atlantic American species having been detected in Japan; the genus is unknown on the Pacific side of our continent.—[From the Appendix to Prof. A. Gray's Address to the American Association, 1872.]

MISTLETOE ON THE OAK (see Journ. Bot. ii., 371; viii., 87; ix., 149, 382; x., 174, 377).—The following localities may be added to those which have been already recorded for the occurrence of *Viscum album* on the Oak. Specimens from each are in the Herbarium of the British Museum. "On an Oak in Lord Bolton's Park at Hackwood, Hampshire. Rev. P. Roberts, 1808."—"May 28, 1818. Found in company with Mr. Rishon the Mistletoe growing upon the Oak about

four mills from Maidstone, Kent, by the side of the Medway. James Dickson."—JAMES BRITTEN.

PLANTS OF CO. CORK.—*Callitriche hamulata*, Kütz.—This species, very rare in this county, was found by me growing in a lake (Long Boy) near the top of Priest Leap Mountain. I believe it has never been observed in Cork, except once sparingly by Mr. Carroll, in a well at Glanseskin, Fermoy.—*Callitriche pedunculata*, DC.—This species, which is certainly very near *hamulata*, I have observed in both East and West Cork—as, near Middleton and Mallow in East Cork, and near Dunmanway in West. I think it has only been hitherto recorded from one station—viz., at Clonakilty, by Mr. C. C. Babington.—T. ALLIN.

FLORA OF NORTH CORNWALL.—*Carum verticillatum*, Koch.—This plant, recorded in Dr. Hind's list (p. 38), being quite new to Cornwall, it may interest some of the readers of the Journal to know that, in addition to the Week St. Mary station given by him, it occurs in two other places—at Trewen, where I discovered it in June last year, and at Eglaskerry. I sent a specimen from Trewen to Mr. H. C. Watson, in July, who in acknowledging the receipt says:—"There is an old record for it 'near Moreton' in Devon, but I believe no living botanist has either verified that locality or added a second in Devon." At Trewen the specimens are very few, not more than a dozen occurring in a large field. But near Eglaskerry (where I was fortunate enough to meet with it again in July) it grows in abundance. From this station I sent about a dozen roots to Kew, at the request of Dr. Hooker; and should any readers wish to have a specimen, I shall be glad to supply them, as they are here so abundant that there is no fear of eradication. Prof. Babington gives as the habitat "damp and hilly pastures." In both places where I have seen it, it grows in a marsh. I have also met with the following plants in this district not given by either Dr. Hind or Mr. Baker:—

Geranium columbinum. Plentiful.

G. lucidum. Plentiful.

Geum rivale. Banks of the Kinsey above Launceston.

Adoxa Moschatellina. Hedges near the above.

Sambucus Ebulus. Underlane, Launceston.

Bidens cernua. Common in several places.

Myosotis collina. Hedge-bank near Dutson.

M. versicolor. Common.

Veronica scutellata. Near Dutson.

Pinguicula lusitanica. Week St. Mary.

Lysimachia vulgaris. Banks of the Tamar.

Primula veris. South Pitherwin.—W. WISE.

ALCHEMILLA ALPINA, &c., IN WICKLOW.—As the alpine flora of Ireland is scanty, and on the eastern coast remarkable for the absence of many species which abound in North Wales, it may be interesting to record the discovery of *Alchemilla alpina* on cliffs about 2000 feet above sea-level, in the county of Wicklow. The locality is on the side of Tonelagee Mountain, above Lough Duler. This plant has hitherto been noticed in two places only in Ireland, viz., on Mount

Brandon, Kerry, and on Ben Bulbin in Sligo. It occurs in its newly-discovered site in some profusion. As another contribution to alpine botany, I may mention the occurrence of *Gnaphalium uliginosum* on a shoulder of Mullaghclevaun Mountain, at an altitude of upwards of 2000 feet, not far from Clevaun Lake, where it grows in a small and stunted form; the highest point hitherto observed in the British Isles being 900 feet, as given in Mr. Watson's "Compendium of the Cybele Britannica." *Hymenophyllum Wilsoni* grows on cliffs above Clevaun Lake, on the side of Mullaghclevaun Mountain, at an altitude of over 2400 feet.—H. C. HART.

ON THE PERENNIAL DURATION OF *STELLARIA ULIGINOSA*, *Murr.*—For some time past I have suspected our leading British botanists to be in error in describing this species as an annual, and careful examination of fresh specimens this spring has proved the suspicion to have been well-founded, since this *Stellaria* is certainly of perennial duration, notwithstanding that Boswell Syme in "English Botany," Hooker in his "Student's Flora," Bentham in his "Handbook," Babington in the "Manual," and Lindley in his "Synopsis," all speak of it as an annual. The fresh green masses to be met with at this season in our ditches will, if carefully examined, show the young shoots to have originated from the ends of the old stems now buried in the mud below and fast decaying, since all the nutriment required can be obtained by the roots that have sprung out from the lowest joints of the younger portion beyond.—T. R. ARCHER BRIGGS.

ON THE FRUIT OF GALANGAL.—Whilst engaged lately in looking over herbarium duplicates for distribution, I found, amongst Mr. Taintor's original specimens of my *Alpinia officinarum*, a plant with two perfectly ripe capsules attached, which enables me to complete my diagnosis of the species, thus:—Fructu brevissime pedicellato semipollicari subgloboso apice cicatrice notato tomentoso obscure tenuiter longitrorsus lineolato pericarpio fusco coriaceo, seminibus plurimis mucoso-arillatis obtuse angulatis arcte inter se cohærentibus testa atrofusca lucida. The seeds have very much the flavour of the ordinary Malabar Cardamom, but in a less degree. The fruit of *Alpinia calcarata*, Rosc., is, if I mistake not, still undescribed; the plant is, however, cultivated in many gardens, and I should feel obliged to any botanist who would communicate to me a few capsules for the purpose of comparing them with those of their very near relative. It will be clear from the above description that Mr. Swinhoe's opinion, recorded by me,* that *A. officinarum* furnishes the *Bitter-seeded Cardamom* of Hanbury,† is unfounded. That fruit, of which I have examined specimens from the Canton drug-shops, is larger, destitute of pubescence, more pointed, and readily known by the oblong, flat tubercles, arranged in interrupted longitudinal ridges, by which it is marked. Its seeds are excessively bitter, and their myrrh-like flavour is very peculiar. Hanbury's *Hairy China Cardamom*,‡ of

* Journ. Linn. Soc. Bot. xiii., 3.

† Pharm. Journ. xiv., 418, fig. 8.

‡ Op. cit. 354, fig. 4-5.

which I have also compared druggists' specimens, is still larger, and when soaked in water to restore its size and form, is somewhat trigastrous (to use a convenient term, coined, I believe by Kunth), entirely devoid of hair, but thickly clothed with squarrose, conical, papillose protuberances. It looks, in fact, not unlike the capsule of a *Canna*. The arillus is pleasantly acid, but the seeds themselves taste to me strongly of turpentine rather than of tar, to which Mr. Hanbury likens their flavour.—H. F. HANCE.

Extracts and Abstracts.

ON THE SILPHIUM OF THE ANCIENTS.

By A. S. OERSTED.

IN a paper originally published in the "Overs. over de K. Danske vid. selsk. Forh." for 1869, of which a German abstract appeared lately in the "Zeitschrift für Ethnologie" (1871, pp. 197—203), the author gives a history of our knowledge of the Silphium plant of antiquity, and the results of modern researches directed to the determination of its nature.

In the middle of the seventh century B.C. some Greeks from the island of Thera settled on the north coast of Africa, in the district then called Cyrenaica, and now known as Barka. The state which was subsequently developed owed its great commercial prosperity very largely to its trade in Silphium, and the numerous coins found in the district bear on one side the head of Jupiter Ammon, and the Silphium on the reverse. This plant grew wild in the uncultivated southern part of the country, and did not succeed under cultivation. From its root when sliced a milky juice exuded, which, when dried or mixed with meal, formed that costly spice which was so highly valued by the Greek and Roman *gourmets*, and was also in high repute as a medicine. Silphium fetched its weight in silver, and was reckoned with other precious things in the Roman state treasuries. During the decline of Cyrenaica the production of Silphium gradually decreased; the country first fell into the hands of the Ptolemies (322 B.C.), and afterwards became a Roman province. In 61 B.C., 30lbs. of Silphium were brought to Rome, and the Emperor Nero had a specimen of the plant sent to him as a curiosity. It was still known in the fifth century A.D.; Synesius, who when he died in 431 was Bishop of Barka, mentions that he supplied a friend with a specimen of the rarity. The reason of its decrease is said by Strabo to have been an incursion of nomadic barbarians who laid the country waste. The farmers also let their cattle feed upon it.*

Much has been written as to the nature of this remarkable plant, which, from the description and the figures on the coins, has always

* For an exhaustive account of all that can be read in the ancient authors on the Silphium plant reference may be made to Thirige's "Res Cyrenensium" (Hafniæ, 1828), pp. 304—315.—[Ed. Journ. Bot.]

been known to be an Umbellifer. Modern travellers who have visited Barka (now an altogether desolate land, with numerous ruins of towns and temples), such as Della Cella, Pacho, Barth, the brothers Beechey, and more lately Rohlf, have considered a common Umbellifer which the natives call Drias (*Thapsia Silphium*, Viv., *Laserpitium Drias*, Pacho; according to Cosson (Bull. Soc. Bot. Fr. 1865, p. 277) merely a form of the South European *T. garganica*, L.) to be the Silphium plant; but neither its appearance nor its properties bear any resemblance to those of that plant. The celebrated plant of antiquity was wholesome to cattle; the Drias is poisonous, and has frequently proved fatal to camels. Various other species have been suggested by authors:—*Ferula tingitana*, L., by Sprengel, *Laserpitium gummiferum*, Desf., by Link, *Ferula Assafoetida* by the Dict. d'Hist. Nat., and *Laserpitium Siler*, L.

Prof. L. Müller, when engaged in his work on the coins of Cyrenaica (Numismat. de l'ancienne Afrique, vol. i. "Les monnaies de la Cyrénaïque," 1860), asked the aid of the author on the question of the Silphium; and it was then discovered that a figure on the coins which had been supposed to represent a heart (Dujalais in 1850 (Rev. Numism, p. 256—264) had correctly explained its nature) was the fruit of the Silphium. A close examination showed that this figure presented with considerable clearness the characters of the genus *Ferula*, or a closely-allied genus.

The foetid gum-resin called Assafoetida was also known to the ancients, and considered by them as closely allied to the Silphium, being called medicinal Silphium. The plant yielding this drug was first ascertained by Kaempfer, who in his "Amoenitates exoticæ" (1712), which contains the results of his travels in Asia from 1683—1693, gives (p. 536) an account of it, which, though remarkable for its precision and accuracy, has no exact description of the fruit. This was only supplied a few years ago, when Lehmann, Bunge, and Borszczow again discovered the plant, which was described by Bunge* as the type of a new genus, under the name of *Scorodosma foetidum*. Besides Kaempfer's plant, we know now, however, a second plant yielding Assafoetida, discovered in 1838 by Falconer in North Cashmere, and described by him in 1846 as a new genus, *Narthex*. This flowered in the Botanic Garden at Edinburgh, and Sir. W. Hooker published an excellent figure of it in Bot Mag., t. 5168. The plant is 7 feet high, the leaves grow in pairs close together, and the sheaths closely cover the thick upright stem in a way very unusual in Umbelliferae. The first glance at Hooker's figure recalled to the mind of the author the Silphium plant on the coins, and a closer examination confirmed him in considering *Narthex Assafoetida*, Falc., to be very nearly allied to it.

In the determination of their affinity it is important to insist upon the accuracy with which other plants and animals (*e.g.*, the date-palm, the horse, sheep, gazelle, and jerboa) are represented on these coins; we cannot doubt that in the case of so valuable a plant equal accuracy would be employed. A minute comparison of the figures of the two plants will strengthen our belief in this.

* Mém. de l'Acad. Imp. des Sc. S. Petersb., 1860—61.

If we reduce the picture of *Narthex* to the size of the representation of the Silphium on the coins, and place the one by the other, we shall remark a surprising likeness in the appearance of the two plants. The stem, and form and arrangement of the leaves and flower-stalks, are quite the same, and a comparison of each distinct organ brings out still more clearly this resemblance. The root, or rather the root-stock, of both plants is of the same form and ramification. The erect, thick stem, longitudinally furrowed, which characterises *Narthex*, is also found in the Silphium; these furrows are very clearly depicted on the coins. There is also, particularly if one examines the best representations on the coins, a remarkable resemblance in the arrangement of the leaves; we can see that these are not truly opposite, but only approximate in pairs; the sheaths are very large, with conspicuous longitudinal nerves; the blade is divided into three to five segments, on which again subdivisions are indicated. That these notches should not be represented on the common coins in so small a space is quite natural; if, however, we compare the outline of the *Narthex* leaves with the representation of the leaf-surface of the Silphium, there is a great resemblance. The form and size of the flower-stalks agree entirely in both plants. As to the fruit, we see from the coins that the Silphium quite agrees with *Narthex* and *Ferula*. In these Umbelliferae the fruit is very closely compressed, and furnished with a thin membranous border, for which reason Theophrastus characterises it as foliaceous. The small differences in the structure of the vittæ, by which these genera have been separated, we need not of course expect to find drawn on the coins. On the other hand, there may be usually observed at the bottom and top of the fruit of Silphium small globular bodies, of which the first represents the base of the fruit-stalk, and the second the stylopode. On one coin the carpophore is represented between two mericarps, with their apices turned towards each other. So far as the coins go the Silphium plant might be referred equally well to *Ferula* or to *Narthex*. As, however, it so entirely agrees with the only known species of *Narthex* in habit, it is in every way more probable that it should belong to that genus.* As a species it is not of course to be identified specifically with *Narthex Assafoetida*; not only does the obcordate form of the fruit forbid this, but the properties of the gum-resin. That obtained from the Indian plant entirely agrees with the Persian Assafoetida. The author proposes to call it *Narthex Silphium*.

According to Pliny (Nat. Hist. xvii., 2) there were three distinct zones of vegetation to be distinguished in Cyrenaica—the wooded coast zone, an intermediate zone in which agriculture was carried on, and a hilly and desert zone where the Silphium grew. This description is equally applicable at the present day. The slope of the plateaux from Barka towards the coast is still covered with a luxurious growth of wood, amongst which is especially noteworthy the occurrence of the Cypress, of which Rohlfs brought with him fruiting specimens. As soon, however, as the heights are attained, the appearance of the landscape changes; only low stunted bushes, Artemisias, and Thistles

* The genera *Narthex* and *Scorodosma* are both reduced to *Ferula* by Boissier (Fl. Orient, vol. ii., p. 994) and Bentham (Gen. Plant. i., p. 918).—[Ed. Journ. Bot.]

clothe the ground, whilst splendid ruined towns attest the density of the earlier population. Farther on towards the south the land takes a wilder character, and it was here that the *Silphium* grew in the past. As Barka has not yet been thoroughly explored (since the collection of Della Cella, which laid the foundation for Viviani's "*Floræ Libycæ Specimen*," and Pacho's small collection, we have only the very considerable collection of Gerhard Rohlfs), the hope need not be given up that the *Silphium* plants may still be found either there or farther into Africa. Other plants which have disappeared from the places in which they were known to the ancients are often refound in distant regions; for instance, the African Papyrus, which was formerly very common in Egypt, is now no longer to be found there, but occurs again in the distant swampy regions of the White Nile.—[Translated from a German abstract in the "*Zeitschrift für Ethnologie*" for 1871.]

ON *MONOTROPA HYPOPITYS*.

BY S. O. LINDBERG, M D.

WISHING to contribute to the solution of the interesting question whether *Monotropa Hypopitys* is independent or derives its food from some other plant, I have for several autumns dug up masses of individuals in the neighbourhood of Stockholm, and have come to the firm conclusion that *Monotropa*, at least in its fully-grown state, is not indebted to any other plant for its nourishment. It seems very probable that in its young condition, before its underground parts are perfectly developed, it is in some way parasitic, but that it separates itself when the subterranean position is large enough for the direct nourishment of the plant.

About six or eight inches under the surface of the earth, the thick moss-cover included, we find the masses of rhizomes. These rhizomes are 6—10 cm. long and 2—3 mm. thick, very entangled, irregularly ramified, and flexuous, semi-hyaline, yellowish, and extremely fragile, so that it is quite impossible to get a rhizome out from the lump unbroken. Like the whole plant they are very juicy, and the sap is uncoloured and watery. During desiccation, however, it gradually assumes a black-blue colour, and shows under the microscope very numerous and extremely small dark-blue* granules, imbedded in a more hyaline hardened mucilage. From the sides of the rhizome spring rather numerous peduncles and branches, which latter almost immediately break up into extremely copious, slender, and inextricably entangled branchlets, all of which are quite free from surrounding plants, as is also the case with the somewhat blunt apex of the rhizome, and also with its opposite extremity, which is quite black,

* Can this be indigo? And is the blue of some *Boleti*, which is immediately brought out by exposure to the air, of the same kind? The cause of some Mosses, as *Mnium stellare* and *Blyttii*, *Bryum pallens*, *æneum* &c., especially in water, assuming a dark-blue colour, is also quite unknown.

dead, and shrivelled, often for a length of an inch or more. All the younger parts of the rhizome and its ramifications are whitish on the surface, which is the result of a close felt of *hyphæ* with very small, globular, and uncoloured spores; this covering is especially conspicuous in places where the branches of the rhizome have been lying against some hard object, as stones, &c.*

Microscopical investigation shows that the rhizome is for the most part built up of rounded cells, without any thickening, and containing no starch, but filled with a watery and somewhat viscous juice, surrounding a very conspicuous nucleus and nucleolus. Many of these cells, especially those surrounding the central fibro-vascular fascicle made up of reticulated and dotted vessels, contain a pale orange-coloured oil. The bark is comparatively very thick, and the epidermis is constructed of distinctly smaller cells, without any thickening, and shows no trace of corky tissue. I was also unable to find anywhere root-fibrils or a terminal root-cap. The fully-developed plant thus seems to want all roots, and to absorb its food by the whole surface of the rhizome, an absorption which is the easier as on no part of the underground organs can any corky layer be observed; but on the contrary the whole surface, as also the greatest part of the interior, is composed of living cells with both nucleus and nucleolus: this circumstance also gives evidence both of the rapid growth of the anterior extremity, and of the quick decay of the posterior end of the rhizome. The peduncle agrees with the rhizome in all essential points of structure, and it is impossible to detect any stomata on it or its bracts, or on the calyx; their absence explains the total absence of chlorophyll in the whole plant.

In the fresh state *Monotropa* smells very much like the Tonca-bean, the *Meliloti*, &c.; its taste is that of raw peapods, mingled with a slightly aromatic flavour.

Any part of the plant from which by pressure in the living state most of the juice has been squeezed assumes very slowly and imperfectly the dark-blue colour. In *Monotropa* this blackening, which is found in many more or less true parasites, seems to be occasioned by the contents of the cells during desiccation depositing the above-mentioned small dark granules on the inside of (also in ?) the cell-membrane. But we find this blackening in other plants not at all parasitic, as in *Salix nigricans*, &c.—[Translated by the Author from the "Ofversigt" of the Swedish Academy of Natural Sciences, for 1865.]

* See Mr. Stratton's notes in Journ. Bot. ix., p. 300, on this subject.—[Ed.]

Notices of Books.

Flora Vitiensis : a Description of the Plants of the Viti or Fiji Islands, with an Account of their History, Uses, and Properties. By BERTHOLD SEEMANN, Ph.D., &c., &c. With 100 plates by WALTER FITCH, F.L.S. London: Reeve and Co. 1865—73. (Pp. xxxiv., 454.)

IN part x., published early in the present year, we have at length the completion of this work, which, as the brief biography comprised in it fitly states, "will be a lasting monument to the eminent scientific attainments of its lamented author." Dr. Seemann's own collection was not a large one, but he has made the most of it, as well as of the few other collections known and accessible; and he supplemented the whole by a faithful study of all other Polynesian materials, especially the oldest ones preserved at the British Museum, and those of the Hawaiian Islands, which he had himself transiently visited during the cruise of the *Herald*. His notes upon these early, and some of them long-neglected, collections add much to the importance of the present volume. Another element in this Flora claims mention and commendation, viz., his accounts of the useful plants described, and of native usages in connection with them—such, for example, as the articles on *Solanum anthropophagorum* of horrid memory, *Piper methysticum* or *Kava*, and of the Fiji and Hawaiian Sandal-woods. Dr. Seemann had a happy faculty for this kind of writing, as his more popular works attest. Nor are his critical investigations and notes of botanical affinities to be undervalued. If never of the very highest order, they are acute, often ingenious, seldom fanciful or vague, and, like all his botanical knowledge, truly remarkable under his circumstances and training.

It may be said that he was over-ambitious in undertaking this Flora upon such an expensive plan, after he had been informed that, notwithstanding the favourable disposition of the Colonial Office, the Treasury did not see fit to assist him in the bringing out of such a work. In fact the Government all along evidently "fought shy" of the Fiji Islands. But Seemann, "thinking that what had been collected at so much expense, under great difficulties, dangers, and privations, in a country only partially reclaimed from cannibalism, was worth being made known, and moreover having made it a point in life never to relinquish an idea which [he had] once made up [his] mind to carry out, resolved on the present volume." One may greatly admire the brave spirit without approving the principle, which, indeed, in this case brought ill consequences in its train, and probably cut short a valuable life. For, overweighted from the start, the demands it made upon his time and purse were far greater than he had calculated upon, and at length he had to supply himself with funds for the purpose by a partial exchange of botanical for business pursuits, involving several

visits to Tropical America, where at length he fell a victim to the climate. Hence the delay of the later parts of the work, and especially of the posthumous 10th fasciculus, which is only now issued. Yet the author seems to have done his part long before he left England for the last time. His preface bears the date of October, 1869, and the interesting historical notice and introduction appear to have been as early written.

The Cryptogamic orders were assigned to collaborators, who, it would appear, were not very much in arrear; for the earlier sheets of this part of the volume bear the same date as the preface, and even the last are dated June, 1871. The real date of publication of all after page 324, notwithstanding, is in 1873.

The Filices are carefully elaborated by Mr. Carruthers. We note with interest that Brackenridge's genus *Diclidopteris* is maintained; his *Diellia* falls into *Lindsæa*. The *Musci* and *Hepaticæ* are contributed by Mr. Mitten, who has carried out to the full Dr. Seemann's plan of taking account of all known Polynesian species. Indeed his presentation of the extra-Fijian Mosses, &c., is almost as ample as that of the Flora in hand. The *Lichens* and the *Fungi* were very sparingly collected, and are of small account in the work.

The Additions and Corrections represent, we may presume, some of the author's last botanical work, in which a new genus, *Trimenia*, is appropriately dedicated to his friend, the editor of this Journal. Unfortunately it is founded on male flowers only. Another, *Thacombaua*, as described from incomplete materials, commemorates a native dignitary, *Thacombau* (= *Cacobau*), "King of Viti."

As to the discrepancy noted between the length of the filaments of *Ilex Vitiensis*, A. Gray, as figured and in Dr. Harvey's specimen, it is no doubt explicable in the fact that most species of the genus manifest a dioecio-dimorphism in this very way, even when it does not proceed to unisexuality as in the common Holly.

After all that has been done both by Dr. Seemann, and before him by the American expedition under Wilkes, it remains true that the botany of these islands is most imperfectly known. "Little more than the coast of the larger islands has been skimmed; and the interior of Viti Levu and its numerous peaks and mountain ridges still offer a rich field for botanical discovery." The obstacles to exploration, which at first were insuperable, are fast diminishing. Whoever at length enters the field, and reaps the harvest, will no doubt appreciate his great obligations to the lamented author of the "Flora Vitiensis."

A. GRAY.

A Monograph of Ebenaceæ. By W. P. HIERN, M.A. (From the Transactions of the Cambridge Philosophical Society, vol. xii., pt. 1.) Cambridge, 1873. (Pp. 274, tab. 11.)

STUDENTS of systematic botany have reason to be thankful to the author for this very complete monograph. The natural order treated of is one of the least attractive, being neither distinguished for beauty of flowers or foliage, nor for utility. It is a great gain when such obscure groups are taken in hand and faithfully worked up by competent persons, since in all large herbaria and collections there will be

found numerous undetermined specimens, and considerable confusion in nomenclature. It is thirty years since De Candolle's monograph was published in the eighth volume of the "Prodromus," and 160 species are there enumerated under eight genera. Mr. Hiern reduces these genera to four, and adds a new one; whilst the great increase in our knowledge of the group is shown by the addition of about 100 new or previously undescribed species. The genera maintained are—*Royena* (13 species); *Euclea* (19 species); *Maba*, including *Macreightia*, *Holochilus*, and *Rhipidostigma* (59 species); *Diospyros*, including *Cargillia* and *Rospidios* (about 170 species); and *Tetraclis*, a new monotypic genus from Madagascar, which differs from the rest of the order in its strictly valvate corolla-æstivation.

With the majority of botanists the author prefers to keep *Ebenaceæ* among the gamopetalous orders; its closest affinities are considered to be with *Olacineæ*, *Styraceæ*, *Anonaceæ*, *Ternstræmiaceæ*, *Sapotaceæ*, and *Ilicineæ*.

The species in each genus are very fully described, the diagnosis being in Latin and a longer description in English. Full synonymy and references are given, and the geographical distribution and other particulars concisely stated. A synoptic key to the species is also in each genus prefixed to the monographic descriptions. Besides the descriptive portion, we have an account of the economic products of the order; its geographical distribution, traced through Grisebach's Regions, with lists of species in each; and—a great convenience to keepers of herbaria—lists of numbered collections of *Ebenaceæ* made by various travellers, with the determinations attached. The very complete manner in which the subject has been treated is further shown by the enumeration and description of all the fossil species, about sixty of which have been published in various memoirs. In reference to these the author says: "With regard to many the utmost inference founded on reasonable grounds which can be deduced is a favourable suggestion of *Ebenaceæ* for the family to which the specimens may probably belong"; and adds: "I wish in no way to confirm them in their present places; but since they have been published as Ebenaceous, I quote them as they stand." The geological formation and locality are given for each species. No mention is made of histological characters, nor has the study of development formed any part of the author's plan.

The plates represent *Royena glandulosa*, Harv., *Euclea multiflora*, Hiern, *Maba punctata*, Hiern, *Diospyros tricolor*, Hiern, *D. Heudebotii*, Hiern, *D. tetrandra*, Hiern, *D. polyalthioides*, Korth., *D. prucei*, Hiern, *D. emarginata*, Hiern, *D. Dendo*, Welw., *Tetraclis cusiaefolia*, Hiern.

Few botanists would be competent to criticise this laborious monograph, the author of which is probably far better acquainted with the rather unattractive plants of which it treats than any other person.

H. T.

Le Calice des Composées. Essai sur l'unité du développement histologique dans le Règne Végétal. Par SAMSOE LUND, Cand. Phil. (From the "Botanisk Tidsskrift," 1872, pp. 140.)

THE object of this essay is to establish the foliaceous nature of the pappus of Compositæ. The author has specially examined the development of the pappus of *Cirsium arvense*, and from the study of it concludes that the pappus consists of leaves, each leaf containing a true fibro-vascular bundle, generally consisting of cambiform cells, but under certain circumstances developing spiral vessels. Unfortunately we do not think that the pappus can be thus easily disposed of. What are we to make of the two scales in *Helianthus*, or the numerous whorled scales of *Centaurea*? Judging from the structure of the flower of the Compositæ with five petals and five stamens, we should naturally expect five parts of the calyx opposite the stamens and alternating with the petals. Now it is only in a few very rare cases that we find the pappus developing from these five spots (*Taraxacum officinale* and *Carduus*). Those who know anything of the development of leaves will at once recall to memory their well-known acropetal mode of development, the youngest always being nearest the growing point. In the Compositæ, however, it is *after* the formation of the *petals* that a more or less marked contraction forms which indicates the place of origin of the pappus. It is not till after the formation of the stamens that the bodies of which the pappus consists first appear. As already mentioned, the parts of the pappus rarely develop at the five places where we would *a priori* expect calyx leaves to form. In *Bidens* with a pappus consisting of from 2—4 bristles, or in *Helianthus* with 2 scales, the parts are developed either in the middle plane or laterally. When many parts are present, then they occupy the whole periphery of the flower and develop simultaneously. In *Centaurea*, where many whorls of scales exist, the inner whorls develop first, the outer last. It seems probable that the morphological value of the pappus may not always be the same. Thus in some (as in *Cirsium arvense*) the so-called pappus is a calyx consisting of leaves, while in the majority the scales, bristles, or hairs of the pappus are undoubted trichome structures. Lund seems to have studied an exceptional form, and thus been led into error.

A part of the essay is devoted to the consideration of Hanstein's dermatogen, periblem, and plerom. Lund does not agree with the definitions given by Hanstein, and substitutes the terms pycnome and peripycnome (contracted perinome) for those of Hanstein. The pycnome of Lund is exactly equivalent to the plerom of Hanstein, while his dermatogen and periblem are equivalent to Lund's perinome. Although Hanstein's definitions may perhaps require a little modification, still we do not think that Lund has in any way improved upon them.

Those who wish for fuller information on the development of the flowers of Compositæ should consult the papers of Buchenau in the "Botanische Zeitung," 1872, p. 305, *et seq.*

W. R. McNAB.

Proceedings of Societies.

BOTANICAL SOCIETY OF EDINBURGH.—*Jan. 9th.*—"On *Lolium temulentum*, L." By A. S. Wilson, communicated by Prof. Dickie. With the object of ascertaining by experiment whether the seeds of the Darnel were poisonous, the author ate on different occasions 2 grains (8 ripe fruits), 4 grains, 25 grains, 50 grains, 100 grains of the powdered fruits separated from the husk, without any ill effects or symptoms of any kind; and afterwards he ate this meal mixed with the husk and with wheat-flour in different proportions and in large quantities, with the same result. The poisonous qualities attributed to Darnel may be due to the presence of Ergot in the grain.—"On the Effects produced by Stem-Pruning small plants of the Nidpath Castle Yew." By J. McNab.—"On the Occurrence of *Psilotum triquetrum*, Sw., on the decayed tubs in the Palm-house at the Royal Botanic Garden." By the same.—"Notes on the Flora of Helvellyn, Cumberland." By J. F. Robinson. A full list of the species noted was given. "Just beneath the summit is a small lake called Red Tarn, shut in except on the north by overhanging cliffs; on the southern side a rich alpine flora is met with. Peeping out from beneath the loose rock are *Cerastium alpinum*, *Silene acaulis*, with abundance of *Rhodiola rosea*, and here and there small patches of *Veronica saxatilis* and *Saxifraga oppositifolia*. A small tuft only of *Saxifraga hypnoides*, var. *platypetala*, or it may be *S. palmata*, was observed. *S. hypnoides* was more plentiful. Several patches of *Carex rigida* and *Juncus triglumis* were seen, together with abundance of *Oxyria reniformis* and *Salix herbacea*. Amongst the more common species seen about the summit were *Vaccinium Vitis-Idæa*, *Armeria alpina*, *Veronica serpyllifolia*, var. *humifusa*, *Arenaria verna*, *Solidago Virgaurea*, *Arbutus Uva-Ursi*, *Hieracium alpinum*, *H. Lawsoni*, *Sibbaldia procumbens*, *Lycopodium clavatum*, *L. Selago*, and *L. alpinum*, *Thalictrum alpinum*, and *Rubus saxatilis*. The object of the visit was to ascertain if the same flora existed near the summit as was reported nearly fifty years ago from thence. I missed several species, such as *Saxifraga nivalis*, *Asplenium germanicum*, *Sedum dasyphyllum*, and *Woodsia ilvensis*. It is very doubtful if the *Woodsia* was ever found on the mountain, and I think *S. nivalis* has been mistaken for a form of *Saxifraga stellaris*. I have, however, seen a specimen of *Asplenium germanicum* said to have been collected on the Striding Edge, but after a most careful search I failed to find it. I think some error has been committed with respect to *Sedum dasyphyllum*."—"Notes on some British Fungi," with drawings by F. M. Caird. By J. Sadler.—"Stations for New and Rare Plants near Edinburgh." By J. Brown and T. Drummond.—"On British Plants peculiar to Scotland, and their Geographical Distribution in other Countries." By J. Sim.

Feb. 13th.—"On the Flowers of *Coniferae* and *Gnetaceae*" (abstract of Strasburger's observations). By W. R. McNab, M.D.—
 "Notes on the Recent Transmission of Ipecacuan plants to India." By J. McNab.—
 "Notes on *Carex punctata* and other Plants found in the Parish of Colvend, Kirkcudbright." By Rev. J. Farquharson (see p. 47).—"Notes on Forms of *Pyrus Aria*, Sm." By J. F. Robinson.—
 "Remarks on *Chlorococcum vulgare*, Grev." By J. McNab.—
 "Report on Open-air Vegetation of the Royal Bot. Garden." By the same.

March 13th.—"Notes on the Monte Generoso and its Flora, 1872." By J. F. Duthie. The mountain is about 5700 feet above the sea, being the highest peak in the tract lying between the Lakes of Como and Lugano; the larger portion, lying towards the Lake of Lugano on the west, is in Switzerland, the remainder to the east belongs to Italy. It is a limestone mountain of Jurassic age overlying schist; the rock is very porous, which partly explains the scarcity of surface streams. Lists of the species found were given, and specimens presented to the University herbarium.—
 "Remarks on the Characters of Fossil Plants, and on a new Fossil Fern." By Principal Dawson, Montreal. The Fern is from the Devonian of Virginia, and has affinities with *Sphenopteris* and *Archæopteris*; it will be described by Mr. Meek, of Washington. The author considers that "palæontological botanists are disposed too much to apply the methods of recent Botany to fossil plants, especially Palæozoic ones."—
 "Additions to the Lichen-Flora of New Zealand." By J. Stirton, M.D. Thirteen undescribed species were defined; they were collected by Mr. J. Buchanan, of the Colonial Museum, Wellington.—
 "Report on the Open-air Vegetation of the Royal Botanic Garden," and "Remarks on the Colour of certain *Cupressineæ*." By J. McNab.—
 "Notes on the Cultivation of Cinchona and Rhea in India." By W. Jameson, M.D., Saharunpore; communicated by Prof. Balfour. Writing on July 8th, 1872, Dr. Jameson says:—"We are now carrying on extensive operations with Cinchona in the Himalayas; our success, however, is most doubtful. We have had plants 8 and 10 feet in height, but all have been cut down by the frost. The result, therefore, will, I fear, be a failure. A private company have spent upwards of £4000, and have at last abandoned the undertaking. Government operations have been conducted on a small scale, but sufficiently large for experimental purposes; the loss will therefore not be great. In the Lower Himalayas, in Kumaon Gurhwal and Kohistan of Punjab, the thermometer frequently marks 6 to 8 deg. Fahrenheit below freezing-point at altitudes of 2500 and 3000 feet. This cold we have to contend with. At Rani Khali, the new military station in Kumaon, altitude about 6000 feet, there were some plants of the *Cinchona succirubra* 4 to 5 feet in height, when I visited the station in October last. In January a heavy fall of snow took place, and all the plants, though covered with matting, perished. In the Kangra Valley, Deyrah Dhoon, and Missouri, most of the plants there have met with a similar fate. In the Neilgherries, Sikkim, &c., several species of Cinchona are doing well, and in Sikkim alone the plantations are supposed to contain half a million of plants. Land, too, fitted for their cultivation abounds. For the Kohistan and Dhoons of the North-West Provinces and Punjab tea will be the great

export staple. Most of the plantations in Kumaon Gurhwal, Deyrah Dhoon, and Kangra are progressing in a satisfactory manner, particularly those that have been prudently conducted, and a large export trade of tea is springing up between British India and Central Asia. The demand, however, is chiefly confined to green teas, for which fair prices are realised; 1s. 6d. per lb. is paid at the factory by traders who visit the plantations and purchase the teas. The experiments connected with the Rhea plant (*Bæhmeria nivea*) progress. A most ingenious machine, patented by Mr. J. Greig, of Edinburgh, is now here, and about to be tested; Colonel Hyer, mint-master, and Mr. Prince, superintendent Roorkee workshops, having been appointed judges to report on it and any other machines that may be presented to compete for the £5000 prize. From my Rhea plantation I have already cut down about 100 tons of stems, *i.e.*, about 3 tons per acre, and in another month I expect to get another and heavier crop. It is a wonderful plant, and will, I am confident, be more valuable to the North-West Provinces than Jute is to Bengal. As soon as we get a complete machine, the fibre will become one of the great staples of the North-West Provinces. Among other machines, we have been experimenting with a Roezls machine, which though simple is dangerous in working. By it a poor young Mohammedan lad had both his hands smashed, rendering amputation above the wrists necessary."

April 10th.—James McNab, Esq., President, in the chair.—The following communications were read:—"Note on Tylosis." By Mr. F. M. Caird. The author had found very good illustrations of Tylosis in various species of *Castanea*, *Carya*, *Juglans*, *Quercus*, *Ulmus*, &c. In *Juglans cinerea* the cells are in many instances distinctly dotted. *Ulmus fulva* and *U. campestris*, *Quercus alba* (a Canadian species), *Q. Robur*, and *Q. rubra* furnish fine examples. In woods having a close structure, as *Betula*, *Fagus*, and *Pyrus*, the cells are not readily visible. Tylosis is extremely common in matured exogenous stems, but he had met with no instance of it in endogenous stems.—"Notes on some recent Researches regarding Dichogamy, and Allied Subjects." Communicated by Dr. R. Brown.—"On the Ferns in the Valley of the Derwent." By Dr. T. W. Mawson; communicated by Mr. Sadler.—"Report on the Open-air Vegetation at the Royal Botanic Garden (No. 3, 1873)." By Mr. McNab.—Mr. Peach exhibited a series of microscopic specimens of fossil plants which he had got from the ash-beds near Petticur, Burntisland. They consisted of portions of *Stigmaria*, *Lepidodendron*, *Dictyoxydon*, *Grievii*, &c., and well showed the structure of most of them. The most interesting was a mass in which two specimens of *Lepidostrobus* were imbedded, both showing macrospores in the lower part and microspores in the upper part of each one. The microspores are of a bright orange colour, the macrospores whitish, the walls of the sporangia, &c., and the stem on which they are supported darkish-brown, all enclosed in a reddish-brown matrix. The division between the two spores is so marked both by colour and form that it can be seen at a glance, whilst both spores may be distinctly seen under the microscope in the prepared specimens. Although cones bearing both spores have been described by Brongniart and others, they are so rare

that he thought it right to lay them before the Society, he never having seen one; and as they were only discovered by him last week, he hoped he would be excused for the imperfect manner in which they were exhibited.—Prof. Balfour stated that, while lecturing lately in the Science and Art Museum, he had observed there a specimen of a Fern, without a label, having a strong resemblance to an undescribed species of *Sphenopteris*, from the Devonian, recently noticed by Principal Dawson, of Montreal. He had obtained a drawing of the specimen and transmitted it to Principal Dawson, who had written as follows:—“The Fern of which you enclosed a sketch I take to be *Sphenopteris artemisiæfolia* of Brongt., from the Coal formation, which that botanist compares to the modern *Asplenium erosum*, but which Schimper has made the type of a new genus, *Eremopteris*, so named from its apparent want of analogy with any living Fern. The resemblance of this to the Devonian Fern I sent you occurred also to me, and in notes on it which I gave to Mr. Meek, of Washington, who is to describe these Virginian Ferns, I mentioned it, and pointed out that the Devonian species helps to connect this with the genus *Archæopteris*—*Palæopteris* of Schimper, but that name is preoccupied by a genus of Geinitz—so characteristic of the Devonian.” Mr. Dawson concludes:—“I am now preparing a report on the plants of the lower Carboniferous of Nova Scotia, which will interest you, as they are very like those of the lower Coals in Scotland; and I propose to give in it as precise diagnoses as I can for the different genera and species of *Sigillaria*, *Lepidodendron*, &c., derived from the structure and markings of the stems and branches.”

Botanical News.

ARTICLES IN JOURNALS.—APRIL.

Grevillea.—M. J. Berkeley, “Notices of N. American Fungi” (contd.).—M. C. Cooke, “British Fungi” (contd.).

Scottish Naturalist.—A. Davidson, “Contributions to a Flora of Ross-shire.”

Quart. Journ. Microsc. Science.—W. Archer, “Abstract, with Notes, of Wittrock’s Freshwater Algæ of Gotland and Öland.”—W. T. T. Dyer, “On Stem Structure of the Carboniferous *Lycopodiaceæ*.”

Monthly Microsc. Journal.—R. L. Maddox, “Remarks on a minute Plant Found in an Incrustation of Carb. Lime” (tab. 12, *Botrydium minutum*).

Botaniska Notiser.—T. M. Fries, “On the Flora of Nova Zembla.”—F. Scheutz, “New Localities for Plants” (Sweden).

Botanische Zeitung.—A. W. Eichler, “On the Structure of the Flower of *Canna*” (contd.).—L. Wittmack, “Catalogue of Brazilian Woods.”

Hedwigia.—P. Magnus, “Mycological Observations.”

Flora.—J. Reinke, "On the Rhizomes of *Corallorhiza* and *Epipogon*."—A. Engler, "Notes on the S. American *Olacineæ* and *Icacineæ*" (contd.).—H. Wawra, "Notes on the Flora of the Hawai Is." (contd.) (*Tetraplasandra Waimeæ*, n.s., *Heptapleurum* (?) *Waimeæ*, n.s., *Xylosma Hillebrandii*, n.s., *Schiedea Oahuensis*, n.s., *S. Kaalæ*, n.s.).

Oesterr. Bot. Zeitsch.—A. Rehmann, "Diagnoses of the known *Hieracia* of Galicia and Bukowina" (contd.).—Kerner, "Distribution of Hungarian Plants" (contd.).—A. Val de Lièvre, "Notes on certain *Ranunculaceæ* of the Flora Tridentina" (contd.).—R. Huter, "Botanical Notes" (from Sexten, Tyrol).—C. Haussknecht, "On *Scleranthus*."—R. von Uechtritz, "Notes on Knapp's Pflanzen Galiciens" (contd.).

Bull. Bot. Soc. France (vol. xix., p. 3).—G. Bentham and E. Cosson, "Compositarum genus novum algeriense" (*Warionia*; *W. Saharæ*, Oran and Morocco).—Renault and Sagot, "Note on the Colouring Matter of the Green Ebony of Guiana."—J. Duval-Jouve, "On *Juncus striatus*, Schousb., and *J. lagenarius*, Gay."—A. Pérard, "Anatomical Researches in the *Menthoideæ*."—P. Duchartre, "On Germination of *Delphinium nudicaule*."—C. Royer, "New Plants for the Dep. Côte-d'Or."—P. Duchartre, "Structure and Multiplication of the Bulb of *Lilium Thomsonianum*, Lindl."—M. Cornu, "On the Development of *Agaricus* (*Coprinus*) *stercorarius*, Bull., and its *Sclerotium* (*S. stercorarium*, DC.)."—A. Franchet, "On an Adventive Flora observed in the Dep. Loire and Cher in 1871" (neighbourhood of Vendôme, Blois, and Cheverny: 199 species observed, brought with fodder for the French Army*).—H. Loret, "Plants in Herbaria of Montpellier, &c."—E. Cosson, "*Biscutellæ* species explanatæ et dispositæ" (species reduced to 7).—Ib., "Descriptio *Biscutellæ* novæ algeriensis" (*B. radicata*, Coss. & DR.=*B. virgata*, Coss. & DR. in herb. olim, non Jord.).—A. Brongniart, "On an Arborescent Fern of the Genus *Lastrea* (*L. arborea*, n.s., Luzon).—E. Prillieux, "On the 'Cloque' (disease) of the Peach."—G. de S. Pierre, "Answer to M. Cauvet."—Ib., "Fertilisation of Orchids by Hymenoptera."—E. Malinvaud, "Plants observed in Environs of Gramat, &c."—E. Fournier, "On the *Hymenophylleæ* coll. in Central America by C. Wright, Fendler, and Husnot" (*Didymoglossum ovale*, n.s., Fendl. n. 25).

Bull. Soc. Bot. Belgique (30th April).—B. C. Dumortier, "Critical Examination of the *Elatineæ*" (*E. Hardyana*, n.s.).—C. J. Lecoyer, "Note on Flora of Wavre and Environs."—A. Thielens, "Account of Excursion to the Laacher-see."—Ib., "Report of the General Herborisation of the Society, 1872" (to the Eifel).

Nuovo Giorn. Bot. Ital. (25th April).—N. Terraciano, "Enum. plant vasc. in agro Murensi sponte nasc." (contd.).—A. Mori, "Review of Botanical Communications to the Congress of Italian Naturalists" (contd.).—F. von. Mueller, "List of Plants collected in Central Australia by Giles."—S. Venzo, "Account of an Alpine Excursion."

* This list may be compared with the similar one made in the environs of Paris in the same year (see Journ. Bot. 1872, pp. 339—344). Ninety-one species are common to both lists.

New Books.—Parlatore, "Flora Italiano," vol. v., pt. 1 (Florence).—F. Hoefler, "Histoire de la Botanique, de la Minéralogie et de la Géologie" (Paris, 4s.).—B. Verlot, "Les Plantes Alpines" (Paris, 30s.).

The plates of the last published part of Hooker's "Icones Plantarum" (tt. 1126—50) are chiefly devoted to new plants of the orders *Rubiaceæ* and *Compositæ*.

From the 3rd Annual Report of the Wellington College Natural History Society, we regret to find that, in spite of the efforts of the energetic President, the Rev. C. W. Penny, Natural Science is not in a flourishing state in the school. The Report contains a list of the plants observed by Mr. Penny in the neighbourhood of the College, the gaps in which, especially in the less attractive natural families, show how much yet remains to be done in this direction.

We are informed that Mr. F. Townsend is collecting materials for a Flora of Hampshire with a view to future publication, and that Mr. F. I. Warner, of Winchester, has kindly placed his materials at the disposal of Mr. Townsend. As much more still remains to be done, Mr. Townsend will be glad to receive lists of plants for the county from those who already possess them, and invites the assistance of those who may be disposed to form lists during the ensuing season. The value of the lists will be greatly increased if accompanied by specimens, except in the case of the very common and generally distributed plants; exact localities and dates should always be given. The county will be divided into river basin districts. Communications may be addressed to F. Townsend, Esq., Shedfield Lodge, Fareham, Hants; but parcels should be sent to Shedfield Lodge, Botley Station, L. & S. W. R.

Mr. F. van Horen has been appointed Conservator of the Royal Museum of Natural History of Belgium.

On the 12th of May, at Lowestoft, Suffolk, Lady Smith (the widow of Sir James E. Smith, the eminent botanist, founder and first president of the Linnean Society, who died in 1828) celebrated her 100th birthday by a dinner to 107 persons of both sexes, whose united ages amounted to 8228 years, giving an average of about seventy-seven years to each. Lady Smith has always taken the greatest interest in the Linnean Society, and has recently presented to it a series of letters forming the correspondence between her husband and Mr. Macleay, the first secretary of the Society. At the recent anniversary meeting an address to Lady Smith was unanimously voted by the Society, and signed by the President, congratulating her on the completion of her 100th year in health and mental activity.

At the same meeting of the Linnean Society on the 24th of May, the President, Mr. Bentham, delivered his customary annual address. The subject chosen was the recent progress of researches connected with vegetable morphology, development, and physiology, the works of Strasburger on the *Coniferæ* and *Cycadeæ* and H. Müller on insect fertilisation being especially dwelt upon. This is probably the last annual meeting which will be held in the rooms of old Burlington House, the apartments in the new building facing Piccadilly intended for the Society being now far advanced towards completion.

We are very sorry to have to announce the death of one of our

most promising English botanists of the rising generation—Mr. G. E. Hunt, of Bowdon, near Manchester—which took place on the 26th of April, at the age of thirty-two. From his schooldays he took a great interest in Botany, and by the time that he was twenty had thoroughly explored the Manchester district, and added several new species to its flora. At that time he was one of the most active members of the Botanical Exchange Club, and the judgment with which his parcels were selected and the care with which his specimens were dried made him one of its most valuable supporters. Many years ago he became intimately acquainted with Wilson, and devoted himself especially to the Mosses. He held a responsible situation in a bank in Manchester, so that his leisure for botanical work was not great; but in spite of these disadvantages he formed one of the finest collections of British Mosses in existence, a large proportion of which were gathered with his own hands during his holiday tours amongst the Scotch, Lake, Irish, and Welsh mountains. In all questions connected with his favourite department his eminent characteristics were thoroughness and soundness of judgment. Before deciding upon any doubtful question he took great pains to study all available sources of information, and his naturally clear mind made him an excellent judge of the value of his facts when accumulated. As a correspondent he was most kind and liberal both with his specimens and time. He was one of the principal English correspondents both of Schimper and Lindberg, and gathered together an excellent collection of authentically-named Continental and extra-European Mosses and of the best bryological books. To him as much as to anyone else is due the great advance in Bryology that has taken place in Britain since the publication of Wilson's magnum opus; and upon the death of his friend it was hoped that he would have undertaken, with the help of Wilson's specimens, the editing of the new edition of the "Bryologia," which the latter did not live to accomplish. This, unfortunately, his business engagements and the state of his health at the time would not allow. It took a strong impulse to get him to write anything for printing, and his only published papers are his notes on new and critical Mosses contributed at different times to the Memoirs of the Literary and Philosophical Society of Manchester. He died of congestion of the lungs, after a fortnight's illness, and was interred on the 30th of April, at St. Saviour's Church, Plymouth Grove, Manchester.

John Stuart Mill, the celebrated logician and metaphysician, died at Avignon on May 10th. In his early life he was an enthusiastic field botanist, and contributed numerous short notes and papers to the early volumes of the "Phytologist" on Surrey and Hampshire botany. In the "Flora of Surrey" his name stands as voucher for very numerous localities. So far back as 1822 he noticed the American *Impatiens fulva*, now so abundant along the lower tributaries of the Thames, by the Tillingbourne at Albury. He also contributed to the new series of the "Phytologist," edited by his friend, Mr. A. Irvine, who, it is remarkable, has survived him but three days. His chief paper here is one on Spring Flowers in the South of Europe. During his recently prolonged residence at Avignon, Mr. Mill returned with pleasure to his botanical pursuits,

and it is said had made large collections towards a Flora of the district. Though chiefly followed as an outdoor amusement, traces of Mr. Mill's botanical pursuits can be readily traced in his writings. He did not, however, ever go deeply into the philosophy of the science, or contribute anything which entitles him to rank among those who have advanced Botany by original work.

We can now only allude to the death on May 13th, at an advanced age, of Alexander Irvine, whose name has been familiar to British botanists for the last forty years. We hope to give a sketch of his botanical work, which covers so long a period, and has had considerable influence in spreading a more general knowledge of the science, in our next number.

By the kindness of Prof. A. Gray, we have had the opportunity of reading his biographical notice (which appears in *Silliman's Journal* for June) of the late Dr. John Torrey, whose death we recorded in the last number. Space will not permit us to quote more than a small portion of the latter part of this interesting memoir. After an account of his long series of important contributions his biographer goes on:—"Even at the last, when he rallied transiently from the fatal attack, he took in hand the manuscript of an elaborate report on the plants collected along our Pacific coast in Admiral Wilkes's celebrated expedition, which he had prepared fully a dozen years ago, and which (except as to the plates) remains still unpublished through no fault of his. There would have been more to add, perhaps of equal importance, if Dr. Torrey had been as ready to complete and publish, as he was to investigate, annotate, and sketch. Through undue diffidence and a constant desire for a greater perfection than was at the time attainable, many interesting observations have from time to time been anticipated by other botanists. All this botanical work, it may be observed, has reference to the Flora of North America, in which, it was hoped, the diverse and separate materials and component parts, which he and others had wrought upon, might some day be brought together in a completed system of American Botany. It remains to be seen whether his surviving associate of nearly forty years will be able to complete the edifice. To do this will be to supply the most pressing want of the science, and to raise the fittest monument to Dr. Torrey's memory. In the estimate of Dr. Torrey's botanical work, it must not be forgotten that it was nearly all done in the intervals of a busy professional life. . . . Eight years ago he was sent by the Treasury Department to California by way of the Isthmus; and last summer he went again across the continent, and in both cases enjoyed the rare pleasure of viewing in their native soil, and plucking with his own hands, many a flower which he had himself named and described from dried specimens in the herbarium, and in which he felt a kind of paternal interest. Perhaps this interest culminated last summer, when he stood on the flank of the lofty and beautiful snow-clad peak to which a grateful former pupil and ardent explorer ten years before gave his name, and gathered charming alpine plants which he had himself named fifty years before, when the botany of the Colorado Rocky Mountains was first opened."

Original Articles.

ON A FEW NEW PLANTS FROM YUNAN.

BY S. KURZ.

(TAB. 133.)

DR. J. ANDERSON, who was attached as medical officer and naturalist to the expedition under Major Sladen to Yunan, made a collection of plants (about 800 sp.), which he liberally presented to the Herbarium of the Calcutta Botanical Gardens, and entrusted me with the drawing up of a rough list of its contents. This collection was made under great difficulties, and therefore it is no wonder that some of the specimens are not in a condition sufficiently good for accurate determination. I have, for this reason, preferred to notice in the present communication only the more interesting new forms, instead of giving the complete list of the species. It may suffice to say that the plants from the Khakyen Hills, east of Bhamo, are decidedly Khasyan and for a great part well-known species. The Javanese Rasamala (*Altingia excelsa*) is found here, thus giving for this gigantic tree a range from West Java, Sumatra, Tenasserim to Upper Ava and Mishmi. Tea (*Camellia Thea*), too, is found wild on these hills, but is also cultivated.

Only on arriving in Yunan, on the other side of the Khakyen Hills, Chinese plants make a scanty appearance; but I fear that several of these are only cultivated in the gardens of Momien. At least the comparatively numerous Conifers (amongst them *Ginkgo biloba*, *Chamacyparis pisifera*, *Cryptomeria*, and *Juniperus*) are so, while *Pinus Khasya* forms forests. Of other noteworthy Yunan plants (chiefly collected in the environs of Momien and Hotha) may be named here:—*Catalpa Bungei*, *Solanum lyratum*, *Actinodaphne Chinensis*, *Quercus glanduligera*?, *Broussonetia Kämpferi*, *Anemone Japonica*, *Pæonia albiflora*?, *Corydalis decumbens*, *Sterculia platanifolia*, *Pyrus Japonica*, *Hydrangea Japonica* and another sp., *Rhododendron Indicum*, *Clematis florida* (with double flowers, certainly from a garden), *Funkia Sieboldiana* and another species, *Aristaria Chinensis*, *Buxus*, *Cardamine pratensis*, var.?, *Coriaria Nepalensis*, *Astragalus lotoides*, *Lespedeza cuneata*, *Cratægus* sp., *Parnassia*, *Sarcopyramis lanceolata*, *Sambucus Ebulus* and *S. Thunbergianus*, *Viburnum foetidum* and *V. cylindricum*?, *Lonicera Japonica*, *Leycesteria formosa*, *Luculia Pinceana*, *Gardenia florida*, *Lappa major*, *Lysimachia Japonica*, *Justicia mollissima*, Wall.?, *Plantago major*, *Acroglochin persicarioides*, *Fagopyrum esculentum* and *F. cymosum*, *Euphorbia Jolkinii*, Boiss.? and *E. Lathyris*? or a species very near to it, *Juglans regia*, *Alnus Nepalensis*, *Podocarpus cupressina* and *P. macrophylla*, *Taxus baccata*, *Chamærops Khasyana*, *Acorus Calamus*, *Cælogyne elata*, a *Dendrobium*, *Spathoglottis pubescens*, *Burmanna distachya*, *Allium* sp., *Alisma Plantago*, *Sagittaria sagittifolia*, *Juncus effusus* and *J. Leschenaultii*, *Eriocaulon setaceum*, *Alopecurus*

fulvus, *Arundinaria* sp., *Lycopodium clavatum*, *Osmunda regalis*, *Davallia membranulosa*, and *D. tenuifolia*, *Onychium Japonicum*, &c.

Of the new forms (about 12 species) I shall at present describe only the following :—

1. *STELLARIA VESTITA*, nov. sp.—Rami ascendentes, elongati, teretes, tomentelli glabrescentes; folia ovato-lanceolata, sessilia, basi subcordata, poll. circiter longa, pungenti-acuminata, chartacea, utrinque (subtus floccoso-) breve tomentella et magis minusve canescentia; flores parvi, albi, graciliter pedicellati, in cymis dichotomis filiformibus pilosis axillaribus v. terminalibus; bracteæ oblongo-lanceolatæ, puberulæ; sepala lineari-lanceolata, acuminata, 3-nervia, dense puberula; semina hispida, atrobrunnea. Momien (28 May fl. fr.).—In general habit perfectly agreeing with Malayan specimens of *S. saxatilis*, Ham., as described by Prof. Miquel, but distinguished at once by the inflorescence. Occurs also in Sikkim Himalaya (C. B. Clarke).

SLADENIA, nov. gen.

Sepala 5, persistentia, scariosa, imbricata. Petala 5 (passim 6), elliptico-oblonga, sessilia, crassiuscula, sepalorum longitudine et cum iis alternantia, imbricata. Stamina sæpissime 11 v. 10, raro 12—13, disco inconspicuo annulari? inserta; filamenta brevia, dilatata; antheræ lineari-oblongæ, apice bifidæ, 2-loculares, basi emarginatæ, basifixæ, marginibus et basi antice strigillosæ, loculis poro apicali dehiscentibus. Ovarium elongato-conicum, cum stylo crasso apice brevissime 3-lobo contiguum, 3-loculare, loculis biovulatis; ovula ex apice axis centralis pendula. Fructus—Arbor? ramulis novellis sparse pubescentibus. Folia exstipulata, alterna, crenato-serrata, glauca. Flores parviusculi, dichotomo-cymosi.

This new genus apparently comes near *Cleyera* or *Ternstroemia*; the fruit, however, is not yet known. I have called it after Major Sladen, the energetic head of the Yunan expedition.

2. *S. CELASTRIFOLIA*, n.sp.—Arbor? v. frutex? ramulis junioribus sparse pubescentibus; folia elliptico-oblonga, 3—4 poll. longi, longiuscule petiolata, acuminata, basi acuta, a medio crenato-serrata, chartacea, in sicco glaucescentia, glabra; cymæ axillares, folio multo breviores, iterato dichotomæ, parce puberulæ, glabrescentes; flores parvuli, laterales longe pedicellati, centrales in pedunculi furcationibus subsessiles; sepala c. 2 lin. longa, obtusa, lævia, rigide chartacea; petala obtusa; ovarium glabrum.—Khakyen Hills, Muangla (15 August fl.). (Tab. 133, fig. i.)

DICHOTOMANTHES, nov. gen.

Calyx fructiger ovalis, teres, basi bracteolis 2 subulatis sustentus, coriaceus, 5-dentatus, lobis erectis cum denticulis totidem alternantibus. Petala Stamina 10, annulo perigyno inserta, alternatim breviora; filamenta longiuscula, planiuscula, basi dilatata; antheræ didymæ. Ovarium ; stylus reflexus, brevis, puberulus, sublateralis; stigma incrassato-bilobulatum. Capsula obovata, semi-exserta, sublignosa, nitida, indehiscens?, 1-locularis, seminibus (adhuc nimis immaturis) duobus, altero frequentius abortivo, basilariibus, erectis.—Arbor? novellis lanuginoso-pubescentibus, foliis alternis serratis, cymis terminalibus subcorymbosis dichotomo-ramosis.

3. *D. TRISTANLÆCARPA*, *nov. sp.*—Arbor v. frutex? partibus novellis ramulisque pubescentibus; folia obovata v. obovato-oblonga, $1\frac{1}{2}$ —2 poll. longa, breve petiolata, petiolis tomentosis, acuta, mucronata, argute serrata, supra glabra, nitida, subtus lanuginoso-pubescentia; cymæ terminales, longiuscule pedunculatæ, pubescentes, dichotomo-ramosæ, floribus in furcationibus sitis sessilibus, lateralibus brevissime pedicellatis; calyx fructifer $1\frac{1}{2}$ lin. longus, fugaci-pubescent, intus glaber; capsula nitida, castanea, indehiscens.—Yunan, Hotha (12 Aug. unripe fruits).—Apparently an ally of *Lagerstræmia*, partaking somewhat of the habit of certain species of *Tristania*. The fruits are 1-celled, but it is possible that the ovary may be 2-celled. I am also uncertain about the petals, of which I cannot find any scars left. (Tab. 133, fig. ii.)

4. *CODONOPSIS CONVULVULACEA*, *nov. sp.*—Volubilis, debilis, glaberrima; folia lanceolata v. oblique lanceolata v. linearia, acuminata v. acuta, glaberrima, integra, membranacea, 1—2 poll. longa, breve petiolata; flores parvuli, solitarii, axillares, longissime pedunculati; pedunculi 3—4 poll. longi, cauliformes, volubiles et tortuosi, teretes, glabri; calycis lobi c. 5 lin. longi, lanceolati, acuminati; corolla lilacina? calycis loborum longitudine?—Yunan, Hotha (15 Aug. fl.).—A curious plant, on account of the long twisted peduncles, which occasionally reach the length of 6 to 7 inches, looking quite similar to the stems. A little bract or two may occasionally be observed on them.

5. *GAULTHERIA CRENULATA*, *nov. sp.*—Frutex? ramulis teretibus parce hirsutis, folia ovata v. ovato-lanceolata, breve petiolata, 2—2 $\frac{1}{2}$ poll. longa, basi subcordata v. rotundata, setaceo-crenulata, acuminata, rigide chartacea, costâ subtus pubescente glabrescente exceptâ glabra, nervis venulisque subtus valde conspicuis; flores parvi, albi?, racemosi, pedunculo pedicellisque parce glanduloso-hirtis glabrescentibus; bracteæ oblongo-lanceolatæ, acuminatæ; bracteolæ sub calyce 2, lato-cordatæ, acutiusculæ, obsolete ciliolatæ; calycis laciniae lato-oblongæ, acutæ, coriaceæ, glabræ; corollæ laciniae oblongæ, obtusiusculæ; antheræ corollæ tubi longitudine, apice 3-aristatæ, aristâ media longiore; ovarium 5-loculare, depresso-globosum, 5-sulcatum sericeum; capsulæ adhuc immaturæ calyce vix longiores, sericei, stylo longo glabro abrupte terminatæ.—Yunan, Hotha (15 Aug. fl. fr.).—Nearly allied to *G. leucocarpa*, but at once distinguished by the different serrature of the leaves.

6. *CHIRITA SPECIOSA*, *nov. sp.*—Herba subacaulis circiter pedalis et altior; folia oblique oblonga, longe-petiolata, acuta, grosse dentata, 8—10 poll. longa, membranacea, utrinque pubescentia; petioli 6—7 poll. longi, ferrugineo-pubescentes; pedunculi petiolorum longitudine v. longiores, ferrugineo-pubescentes; flores subpaniculati, speciosi, bipollicares, purpurei?, longipedicellati; pedicelli pollicem circiter longi, ferruginea tomentosi; bracteæ lanceolatæ, acutæ, breves, puberulæ; calyx fusco-tomentellus, usque ad $\frac{2}{3}$ part. 5-fidus, laciniis linearibus, poll. fere longis; corollæ lobi rotundati, stylus et filamenta glabra; antherarum connectivum densissime lanuginosum.—Khakyen Hills, at Ponline (5 March fl.) and Ponsee (10 March fl.).—Also in the Khasya Hills (a more stunted form). Allied to *Ch. urticæfolia*, Ham. and *Ch. macrophylla*, Wall. A figure of this species will be found in Mr.

C. B. Clarke's monographs of Bengal *Commelynaceæ* and *Cyrtandraceæ*, still in the press.

CALOCEDRUS, *nov. gen.*

Strobili subpruniformis squamæ 6, valde inæquales, decussatim oppositæ: 2 inferiores minutæ, sequentes 2 longissimæ, fertiles, intimæ 2 æquilongæ, poll. fere longæ, in septum connatæ. Nuculæ binæ, in alam oblique obovato-oblongam septi longitudinis productæ.—Folia decussatim opposita et quadrifariam imbricata, difformia.—Habitu *Thuyopsidis* generi *Libocedro* quam maxime affine, seminibus autem differt.

7. *C. MACROLEPIS*, *nov. sp.*—Arbor?, ramulis complanatis; folia coriacea, disticha, decussatim opposita et quadrifariam imbricata, tenuia, opaca, difformia: facialia acute trigona, unicostata; marginalia complicato-navicularia, lanceolata, acuta, apice libera et supra articulis paullo producta, subtus concaviuscula; strobili in ramulis lateralibus solitarii, elliptico- v. ovato-oblongi, teretiusculi, e squamis lignosis 6 decussatim oppositis sese arcte tegentibus compositi; squamæ 2 infimæ minimæ, reflexiusculæ; sequentes 2 elongatæ, c. poll. longæ, intimis 2 in septum connatis æquilongis contrariæ; nuculæ ad basin squamarum majorum geminatæ, in alam oblique obovato-oblongam magnam productæ, collaterales.—Yunan, Hotha (19 Aug. fr.). (Tab. 133, fig. iii.)

DESCRIPTION OF TAB. 133.

Fig. I. *Sladenia celastrifolia*.—1. Flowering branch, natural size. 2. A flower laid out. 3. Transverse section of ovary. 4. Vertical section of ditto. 5. Stamen. 6. Porose apex of anther. Figg. 2—6 all somewhat magnified.

Fig. II. *Dichotomanthes tristaniæcarpa*.—1. Fruiting branchlet, natural size. 2. A fruit somewhat magnified, as all the following figs. 3. Transverse section of flowering calyx, showing the ovary. 4. Ditto, showing insertion of stamens. 5. Segment of calyx-border, showing the interjected toothlets. 6. Vertical section of young fruit.

Fig. III. *Calocedrus macrolepis*.—1. Fruiting branch. 2. Leaf-branch, somewhat magnified. 3. Fruit seen parallel with the septum. 4. The same, with some of the median scales removed, showing the pair of seeds. 5. The two seeds. All figures natural size except 2.

NOTES ON THE FLORA OF CO. CORK.

BY THE REV. T. ALLIN.

THE following paper does not aim at anything like a complete treatment of the subject, but comprises merely a few notes that may help to indicate the leading features of the flora of this extensive county. I may premise here that the area of the county is not far from two million acres, and that the whole number of flowering plants on record is about 730, or something like half the entire number of British plants as given in the "London Catalogue," and upwards of seven-tenths of all occurring in Ireland.

First then may be noted here the poverty of our alpine flora—a

poverty unusually great even for Ireland. Of 113 plants of Watson's Highland type, Cork can hardly claim more than the following six:—*Sedum Rhodiola*, *Saxifraga stellaris*, *Hieracium iricum*, *Salix herbacea*, *Juniperus nana*, *Asplenium viride*. I exclude from this list the following, because they occur at or near sea-level with us:—*Hieracium pallidum*, *H. anglicum*, *Galium boreale*, *Arbutus Uva-ursi*, *Isoetes lacustris*. This almost entire absence of an alpine flora, although the county is mountainous over a considerable extent of its surface, is certainly a striking feature in the vegetation of Cork. Further to illustrate this, it may be added that of the six plants enumerated above the second, third, and fourth are recorded each from a single station only.

Next may be remarked the absence or rarity of many of the commoner British species. I designate commoner all those plants marked in the "London Catalogue" as occurring in at least fifty counties. Thus *Thalictrum minus* is found in a single station only in this county, and *T. flavum* nowhere. Of the commoner *Ranunculi*, *R. auricomus* is very rare; during several years' collecting I have never once met with it. Passing to the *Cruciferae*, *Thlaspi arvense* has only been found in a single station, *Lepidium campestre* is very rare, and *Cardamine amara* wanting (as also in all the middle and south of Ireland). *Viola odorata* is not native here, and *V. hirta* altogether wanting. Among the commoner *Caryophyllaceae*, *S. anglica* is very rare, so is *Spergularia rubra*, so are *Cerastium arvense* and *C. semidecandrum*. Both species of *Rhamnus* seem to be absent. Of the commoner Trefoils, *T. medium* is a scarce plant, and *T. striatum* extremely so. *T. fragiferum* and *T. filiforme* are wanting, so too is *Ornithopus perpusillus*. *Vicia sylvatica* and *V. tetrasperma* are very rarely found, and so, too, is *Poterium Sanguisorba*. The beautiful Grass of Parnassus is absent from our flora, as well as *Adoxa Moschatellina*. The Galiums are poorly represented here, *G. cruciatum*, *G. Mollugo*, and *G. uliginosum* being absent. Still more scarce are Campanulas, but a single species being native, *C. rotundifolia*, and that a scarce plant. Of the Gentians none are common; *G. campestris* is rare, and our only other species, *G. Amarella*, is recorded from a single station only.

Taking next the commoner Labiates, *Salvia Verbenaca* is quite rare, *Calamintha Acinos* is wanting, and *C. Clinopodium* is recorded (probably doubtfully) from a single station. Of the Lamiums, *L. amplexicaule* is extremely rare, and *L. album* and *L. Galeobdolon* wanting; so is *Stachys Betonica*. Of commoner *Boraginaceae*, *Myosotis collina* is absent, *Lycopsis arvensis* a casual and very scarce plant, and *Cynoglossum officinale* and *Echium vulgare* very rare. For *Empetrum nigrum* we have only a single station, as also for the Wood Spurge, *E. amygdaloides*, which is the sole Irish station probably.

Among the *Orchidaceae* may be noted as wanting *Neottia Nidus-avis*, *Listera cordata*, *Epipactis palustris*, and *Orchis Morio*. *O. pyramidalis* is very rare, and *O. conopsea* recorded from but one station. Of the many commoner *Carices* we have, as might be expected in our damp soil and climate, nearly all. Two only seem to be absent, *C. curta* and *C. acuta*. On the other hand, the Ferns are poorly represented. Thus *Polypodium Phegopteris* is quite rare here, and *P. Dryopteris* wanting. *Cystopteris fragilis* is extremely rare, *Poly-*

stichum aculeatum rare, *Lastrea Oreopteris* found in one station only, and *Botrychium Lunaria* and *Ophioglossum vulgatum* very scarce. Next may be noted, as very characteristic of our flora, the following few but highly interesting species : two found only in Cork in the British Isles—the Berehaven Orchis, *Spiranthes Romanzoviana*, and the spotted Cistus, *Helianthemum guttatum*—and three found only in Cork of all the Irish counties—*Rosa micrantha* and *R. systyla*, and *Euphorbia amygdaloides* (?). There is besides a larger group that may be fairly termed characteristic of Cork, though not absolutely in Ireland confined to it, e.g., *Asplenium lanceolatum*, *Sedum dasyphyllum* (very possibly native), *Linaria repens*, *Lepidium latifolium*, *Cicendia filiformis*, *Geranium rotundifolium*, *Eufragia viscosa*, *Wahlenbergia hederacea*, *Carex punctata*, *Asplenium acutum* (not found in England or Scotland), *Rumex maritimus*, *Allium Scorodoprasum*, *Carum verticillatum*, and *Juncus acutus*.

Again, highly characteristic of our flora are the following South and West European species : eight out of fifteen in all Ireland—*Helianthemum guttatum* (named above), *Saxifraga Geum*, *S. umbrosa* and *S. hirsuta* (if distinct, which is very doubtful), *Arbutus Unedo*, *Pinguicula grandiflora*, *Trichomanes radicans*, and *Euphorbia hyberna*. Of these *S. umbrosa* and *Pinguicula grandiflora* are so abundant in the west of the county as to arrest by their beauty the attention of the most careless traveller.

Summing up briefly, we find the Highland type hardly represented at all, viz., about 6 out of 113 British; the Germanic type still more poorly represented, not more than 2 being native out of 127 British, viz., *Orchis pyramidalis* and *Bromus erectus*; and the Atlantic type presenting a fair proportion, about 30 out of 70 British species. In addition we possess several characteristic species (chiefly of the English type), some peculiar to our own county, and some which we have in common with one or more neighbouring counties, while we want not a few commoner British plants. Lastly must be noted that we possess the sole European station for the rare *Spiranthes Romanzoviana*.

RECENT ADDITIONS TO OUR MOSS FLORA.—PART VI.

By R. BRAITHWAITE, M.D., F.L.S.

ORTHOTRICHACEÆ.

Fam. 1. *Zygodontea*.

Zygodon gracilis, Wils. MS.—Hobk. Synop., p. 98 (1873). *Amphoridium gracile*, De Not. Epil. Bri. Ital., p. 278 (1869). *Didymodon gracilis*, Schimper MS.

Dioicous, in dense loosely cohering tufts, 1—3 in. high, ferruginous-brown, the apex yellow-green. Stem with repeated innovations, dichotomous or alternately branched, producing from the axils of the

leaves numerous branched brown radicles. Leaves semi-amplexicaul at base, oblong-lanceolate, squaroso-patulous when moist, appressed and variously curved when dry, strongly papillose, keeled with the stout nerve, which vanishes abruptly just below the acute apex; margin undulate, slightly recurved, narrowly hyaline and erosely denticulate towards apex. Cells at base narrow oblong, hyaline or yellowish, upper small opaque, rounded quadrate, papillose. Male inflorescence terminal, its bracts broadly ovate, apiculate, almost nerveless.

Hab.—Old walls at Malham, Yorkshire, in fruit (J. Nowell, 1866); Lancashire (Mr. Hunt).

Zygodon viridissimus, *β. rupestris*, Lindberg in Hartm. Exsicc. (1861); Hartm. Skand. Fl., p. 52 (1864). *Z. viridissimus*, *β. saxicola* Molendo in Lorentz Moosstudien, p. 95 (1864). *Zygodon Stirtoni*, Schimper MS.

Much more robust than the ordinary form. Leaves longer and narrower, with shorter points, and more opaque. Capsules rather more elongated.

Hab.—Rocks, principally on the Scotch coast; near Arbroath, Troup Head (Mr. Fergusson); Menmuir, Forfar, in fruit (Mr. Anderson); near Ben Lawers Inn, in fruit (Dr. Stirton).

Fam. 2. *Orthotricheæ*.

The difficulty experienced by the tyro in the determination of the numerous closely allied species of this group may perhaps be lessened by a full description of all of them. The perfect fruit is necessary for their study, as well with the lid attached as after it has fallen, since the capsule in these two states often presents considerable alteration in form, while the leaves (contrary to what obtains in most other large genera of Mosses) offer but slight diagnostic characters. The two kinds of stomata found on the neck of the capsule in the genus *Orthotrichum* have recently been adopted by several writers as an aid to the discrimination of species, though it is to be feared these organs are too minute to be readily available in practice. Prof. Lindberg in 1866 applied them to an arrangement of the European species, and as he has kindly placed this at my service, I give it here, the species not found in Britain being enclosed in brackets. The superficial stomata are cuticular only, and resemble those seen in *Funaria*, being also termed *phaneropores* by Milde, *stomata normalia* by De Notaris, *stomata nuda* by Venturi; the immersed stomata lie in a recess sunk in the wall of the capsule, the small orifice being surrounded by a ring of elegant converging cells; these also are the *cryptopores* of Milde, *stomata sphincteriformia* of De Notaris, *stomata periphrasta* of Venturi.

It must be observed that the genus *Ulota* (which seems to be as natural as the other great allied genera, *Macromitrium* and *Schlotheimia*) had already been well characterised and named *Weissia* by Ehrhart in 1779, a name applied by Hedwig three years afterwards to a totally different genus; Lindberg, true to the correct principle of maintaining priority in nomenclature, upholds Ehrhart's name, and the *Weisia* of Hedwig he changes to *Simophyllum*.

*Conspectus of European Orthotricheæ, according to Prof. Lindberg.*WEISSIA, *Ehrhart* (*Ulota*, Mohr).

- | | |
|-----------------------------------|------------------------------------|
| 1. <i>W. ulophylla</i> , Ehrh. | 6. <i>W. vittata</i> (Mitten). |
| 2. <i>W. phyllantha</i> (Brid.). | 7. <i>W. Drummondii</i> (Hook.). |
| 3. <i>W. crispula</i> (Bruch.). | 8. <i>W. Americana</i> (P. Beau.). |
| 4. <i>W. Bruchii</i> (Hornsch.). | 9. <i>W. coarctata</i> (P. Beau.). |
| [5. <i>W. curvifolia</i> (Wahl.)] | |

ORTHOTRICHUM, *Hedw.*

- | | |
|---|---|
| I. Stomata immersed. | II. Stomata superficial. |
| A. Peristome double. | A. Peristome double. |
| * Cilia 16. | * Cilia 16. |
| † Seta emersed. | 1. <i>O. Lyellii</i> , Hook. & T. |
| 1. <i>O. pulchellum</i> , Smith. | 2. <i>O. striatum</i> (L.), Smith. |
| †† Seta immersed. | ** Cilia 8. |
| 2. <i>O. rivulare</i> , Turner. | † Seta emersed. |
| [3. <i>O. urnigerum</i> , Myrin., incl.
<i>O. Schubartianum</i> , Lo-
rentz.] | [3. <i>O. macroblephare</i> , Schpr.,
β. <i>Killiasii</i> , C. Mül.] |
| 4. <i>O. Sprucei</i> , Mont. | [4. <i>O. lævigatum</i> , Zetterst.] |
| 5. <i>O. Rogeri</i> , Brid. | 5. <i>O. speciosum</i> , N. Esen. |
| [6. <i>O. leucomitrium</i> , Brid.] | [6. <i>O. microblephare</i> , Schpr.] |
| 7. <i>O. diaphanum</i> , Schrad. | [7. <i>O. Sommerfeltii</i> , Schpr.] |
| [8. <i>O. polare</i> , Lindb.] | [8. <i>O. arcticum</i> , Schpr.] |
| 9. <i>O. stramineum</i> , Hornsch. | [9. <i>O. Blyttii</i> , Schpr.] |
| ** Cilia 8. | [10. <i>O. Breutelii</i> , Hampe.] |
| † Seta emersed. | †† Seta immersed. |
| 10. <i>O. anomalum</i> , Hedw.,
β. <i>saxatile</i> , Wood. | 11. <i>O. affine</i> , Schrad. |
| †† Seta immersed. | [12. <i>O. appendiculatum</i> , Schpr.] |
| 11. <i>O. patens</i> , Bruch. | 13. <i>O. fastigiatum</i> , Bruch. |
| [12. <i>O. alpestre</i> , Hornsch.] | [14. <i>O. microcarpum</i> , De Not.] |
| [13. <i>O. scopulorum</i> , Lindb.] | 15. <i>O. obtusifolium</i> , Schrad. |
| [14. <i>O. Braunii</i> , Br. & Sch.] | 16. <i>O. rupestre</i> , Schleich.,
β. <i>Sturmii</i> , Hornsch. |
| 15. <i>O. tenellum</i> , Bruch. | B. Peristome simple. |
| 16. <i>O. pumilum</i> , Swartz. | [17. <i>O. flaccum</i> , De Not.] |
| 17. <i>O. Schimperii</i> , Hammar. | [18. <i>O. Ætnense</i> , De Not.] |
| [18. <i>O. Venturii</i> , De Not.] | 19. <i>O. Shawii</i> , Wilson. |
| B. Peristome simple. | C. Peristome none. |
| 19. <i>O. cupulatum</i> , Hoff. | [20. <i>O. gymnostomum</i> , Bruch.] |
| [20. <i>O. pellucidum</i> , Lindb.] | |

WEISSIA, *Ehrht.* (1779). *Ulota*, Mohr (1806).

Calyptra obtusely costate, more or less covered by long flexuose ramenta. Capsule clavate or pyriform, with a long neck gradually tapering downward into the peduncle. Leaves curled and twisted when dry, the basal cells hyaline at margin, linear and chlorophyllose in the middle.

* Capsule strongly costate when dry, with 8 vittæ extending its whole length.

1. *W. ulophylla*, Ehrh. Hannov. Mag., pt. 63 (1779). *Orthotrichum crispum*, Hed. Stirp. ii., p. 96 (1788). *Ulota crispa*, Brid. Br. Un. i., p. 299 (1826).

Monoicous, fasciculato-cæspitose, in dense cushions, or rather lax and irregular in outline, the innovations yellow-green, ferruginous below, usually bearing both old and new capsules at the same time. Stem erect or ascending, subdichotomous, with crowded branches. Leaves densely crowded, strongly curled and twisted when dry, patulous when moist; lower ovato-lanceolate, acute, upper from an ovate base, longly linear-lanceolate, all with patulous wings, which are diaphanous at basal angles, so as almost to appear auricled, carinate; nerve reddish or yellowish, reaching nearly to apex. Cells at base rectangular, brown, the alar hyaline with incrassate transverse walls, those towards the nerve elongated, in oblique rows, upper rounded, thick-walled. Capsule quite exserted, the neck gradually attenuated into a strong non-twisting peduncle, stoutly elongato-clavate pachydermous, pale brown, obsoletely 8-ribbed, when dry contracted below the mouth, ovate, deeply sulcate, plicate to the right at the neck, finally narrowed and twisting, and becoming wide-mouthed when old. Epicarpic cells of the vittæ in four rows, forming a thick sinuous rufous stratum, those of the sulci paler and thinner. Lid from a hemispherical base, rather longly mucronate. Teeth broadly linear and pointed, pale, 8 bigeminate, united beyond the middle; cilia of endostome shorter, subulate, of 2 rows of cells, 8 or sometimes 16. Calyptra conic, very rough with yellowish ramenta. Male flower lateral. Spores rufous.

Hab.—Common on Larch and Birch trees. Fr. July, August.

2. *W. phyllantha*, Lindb. *Ulota phyllantha*, Bridel Mantissa, p. 113 (1819).

Densely pulvinate, prostrate, pale yellow-green above, ferruginous below, resembling the last species, but sparingly dichotomous, with longish flaccid branches. Leaves less spreading, softer, long, linear, much acuminate, not dilated at base, twisting and circinate when dry. Cells at base pale, rectangular, the lowest rufescent, a single row diaphanous at the recurved plicate margin, above rounded incrassate, more densely arranged; papillæ smaller; nerve paler, prolonged to apex, and there incrassate, and bearing a cluster of brown jointed cylindric gemmæ.

Hab.—Not uncommon on rocks round the coasts, also on trees.

3. *W. crispula*, Lindb. *Ulota crispula*, Bruch, Bridel Bry. Un. i., p. 289 (1826).

Monoicous, very densely fasciculato-pulvinate, and resembling *W. ulophylla*, but smaller and more slender. Stem subdichotomously innovating, with brown radicles at base. Leaves very densely crowded, lower ferruginous, upper yellowish, soft and thin, erect or flexuose when moist, when dry cirrhato-contorted; the base ovate, concave appressed, and somewhat recurved at margins, then linear-lanceolate, acute, rather narrower than in *W. ulophylla*, carinate, wings patulous, nerve rufescent, vanishing below apex. Cells at basal angles rectangular, hyaline, with incrassate transverse walls,

narrow and yellowish towards the nerve, rounded and incrassate above. Comal leaves longer and broader. Capsule in the moist plant exserted for all length of sporangium, passing gradually into the pale peduncle, which equals the capsule in length, long-necked, elongate-pyriform, very pale, obscurely vittate, leptodermous, when dry with the neck suddenly much contracted and plicate, ovato-urceolate, scarcely contracted below the mouth, strongly 8-costate, finally in decay narrowly trumpet-shaped. Cells of vittæ quadrate, thickened in their longitudinal walls by a sinuous pale stratum, those of sulci larger, irregular, thin-walled. Lid hemispherical, mucronate. Teeth triangular, elongate, often bifid at apex, united in pairs but sometimes separated here and there at the suture, pale. Cilia rather shorter, filiform. Calyptra short conic, very rough with yellowish ramenta. Spores pale green.

Hab.—On Beech and Birch trees in subalpine districts. Fr. May.

4. *W. Bruchii*, Lindb. *Ulota Bruchii*, Hornsch. Bridel Bry. Un. i., p. 794 (1826). *Orthotrichum coarctatum*, Bry. Eur.—C. Müll.

Monoicous, pulvinate, resembling *W. ulophylla*, bright yellow-green above, ferruginous below. Stem erect or ascending from a decumbent naked base, repeatedly dichotomous. Leaves from an ovate base, long, linear-lanceolate, subflexuose, twisted and contorted when dry, margin plane above, recurved below, more gradually pointed than in *W. ulophylla*, and with a paler nerve, the perichaetial erect, longitudinally sulcate at base. Cells at basal wings quadrate, hyaline, with incrassate transverse walls, those next the nerve larger, rectangular in straight rows, the upper with smaller papillæ. Calyptra straw-coloured, deeply cleft, with abundant ramenta. Capsule much exserted, gradually attenuated into a long neck, cylindric-oval, pachydermous, yellow-brown, 8-costate, when dry and empty much elongated, fusiform, contracted at mouth, fuscous. Cells of vittæ in 5 rows, quadrate, thickened in their longitudinal walls by a rufous stratum; those of the sulci laxer. Lid pale, convex at base, rostellate. Teeth bigeminate, finally cleft, longer, reflexed when dry, pale; cilia 8 long as teeth, or sometimes 16 alternately longer and shorter, composed of 2 rows of cells. Spores green.

Hab.—On trees, not uncommon. Fr. July, August.

5. *W. vittata*, Braithw. *Ulota vittata*, Mitten Journ. Lin. Soc. viii., p. 3 (1865). *Orthotrichum calvescens*, Wils. MS.—Hobkirk Syn., p. 95 (1873). *Ulota calvescens*, Schpr. Musc. Eur. Nov., fasc. 3-4 (1866).

Monoicous, resembling *W. Bruchii*, in small yellow-green cushioned tufts. Leaves densely crowded, patent, cirrhate when dry, shorter, from a broader oval base, lineal-lanceolate, carinate, nerve vanishing below the more obtusely pointed apex. Areolation narrower and more solid, cells at base linear and subvermicular in the middle, quadrate and hyaline at margin, above which and extending along the margin for half the length of the leaf, but separated from it by a single row of round cells, are about 6 rows of narrow elongated cells forming a band, those at apex very small and rounded. Male inflorescence gemmiform, on very short branches, the outer bracts oblong-

lanceolate muticous, innermost ovate, obtuse. Vaginula naked. Calyptra glossy, straw-coloured, with only a few short appressed ramenta. Capsule with a very long neck, attenuated into a slender longish pedicel twisted to the left, oval-oblong, straw-coloured, with narrow orange costæ, when dry sulcate, not contracted at mouth. Cells of the vittæ in 5 rows, rectangular, the longitudinal walls incrassate sinuous, rufescent; those of the sulci paler and thinner. Lid convex conical, rufous, with a slender beak of equal length. Teeth longer, bigeminate, reflexed when dry, connivent when moist, pale yellow, reddish towards base, densely papillose externally. Cilia 8, nearly as long as teeth, pale yellow. Spores rufescent.

Hab.—Killarney, on branches of Hawthorn and Mountain Ash, along with *W. Bruchii* (Dr. Carrington); near Dailly, Ayrshire, and Loch Doon (Mr. Shaw). Fr. June. First found in Madeira by Mr. Johnson.

6. *W. Drummondii*, Lindb. *Orthotrichum Drummondii*, Hook. & Grev. —Grev. Scot. Cr. Fl., t. 115 (1824). *Ulota Drummondii*, Brid.

Monoicous, crowded in depressed pale yellowish-green tufts. Stem creeping, rooting in its whole length, with short, thick dense-leaved branches. Leaves from an ovate concave base, short, lineal-lanceolate, obtusely pointed, the comal longer, the perichætil broader at base, all slightly curled when dry, margin a little revolute below; cells at base next to nerve narrow, elliptic, at wing quadrate, hyaline, above minute, rounded incrassate. Nerve red, vanishing below apex. Capsule exserted on a short pedicel, obovate-clavate, when dry 8-sulcate to base, pale brown, when old fusiform, gradually narrowed towards orifice, small-mouthed, furrows deeper, turned to right. Cells of vittæ rectangular, leptodermous. Calyptra conico-campanulate, straw-coloured, sparingly ramentaceous. Lid pale, conical, acicular. Teeth 16, geminate, whitish, rugulose, patulous when dry, perforated or cleft at apex.

Hab.—On Birch and Mountain Ash, Scotland, Ireland, North of England. Fr. August.

7. *W. americana*, Lindb. *Orthotrichum americanum*, P. Beauvois, Prodr., p. 80 (1805). *Orthotrichum Hutchinsiae*, Smith, Eng. Bot., 2532 (1813). *Ulota Hutchinsiae*, Schpr.

Monoicous, densely fasciculate-pulvinate, interwoven at base, or coating rocks in wide strata; the innovations deep green, the rest dark brown, rigid and fragile when dry. Stem at first erect, nearly simple or dichotomous, by age defoliate at base, decumbent and tomentose. Leaves very densely imbricated, erect, rigid, from a more or less dilated base, ovato-lanceolate, carinate, the wings patulous or recurved, when dry appressed, scarcely flexuose, nerve nearly reaching apex. Cells at base rectangular, very narrow, fulvous, the marginal quadrate, hyaline, upper small, rounded. Peduncle far exceeding the comal leaves, when dry sulcate, twisting to the right. Capsule when moist stoutly pyriform, pale greenish-yellow, obscurely 8-vittate, when dry contracted, oblong strongly 8-sulcate, brown; cells at vittæ pachydermous, quadrate, the longitudinal walls incras-

sate with a strong sinuous layer, those of the sulci rectangular; stomata a few on the neck. Lid hemispherical at base, rather longly rostrate. Teeth 8, bigeminate, or sometimes distinct, reflexed when dry, pale, rugulose; cilia rather short, subulate, articulated, sometimes abortive. Calyptra canico-campanulate, very rough with golden-yellow ramenta. Male inflorescence axillary or terminal, reddish.

Hab.—Rock and stones in subalpine districts. Fr. July.

* * Capsule with 8 very short vittæ, and very shortly plicate below the mouth.

8. *W. coarctata*, Lindb. *Orthotrichum coarctatum*, P. Beauvois, Prodr., p. 80 (1805). *Orthotrichum Ludwigii*, Bridel, Musc. rec. Sup., p. 6 (1812). *Ulotia Ludwigii*, Brid.

Monoicous, in small yellow-brown tufts. Stem erect, or creeping at base sparingly fastigiate-branched. Leaves densely imbricated, patulous, appressed when dry, the younger yellowish, the old ferruginous, lower small, lanceolate-subulate, or as well as the upper rather wider ones, from a narrowly ovate ventricose base, elongato-lanceolate, acute, wings generally recurved, carinate, nerve vanishing below apex. Cells at basal margin rectangular, small, the rest very narrow, upper rounded and oval, incrassate. Peduncle far exceeding the comal leaves, straight, when dry sulcate or twisting. Capsule clavato-pyriform, leptodermous, smooth when moist, pale brown; when dry long-necked, pyriform, fuscous, much contracted at mouth, and with 8 short plaits, the rest scarcely sulcate. Cells of vittæ quadrate, strongly incrassate at sides, reddish, the rest quadrate or rectangular. Stomata numerous on the neck. Lid hemispherical at base, rostellate. Teeth 8 bigeminate, whitish, erect when dry; cilia 8, very short, brownish, rugulose, sometimes obsolete. Calyptra straw-coloured, brown at apex, densely ramentaceous.

Hab.—On trees in subalpine districts. Scotland and Ireland. Fr. August.

DUO AGARICI NOVI ANGLICI.

AUCTORE E. FRIES.

AGARICUS WORTHINGTONI — *A. (Stropharia) albo-cyaneus*, Saund. & W. G. Sm. Myc. Ill., t. 29, f. 1—5, non Desm.—Psalliota pileo leviter carnosus, e campanulato convexo, viscido (?), lævi, aureo; stipite fistuloso, gracili, subflexuoso, cyaneo; lamellis adnatis fusco-ferrugineis.

A. albo-cyaneus differt stipite molli, cavo, 3—4 lin. crasso et brevior; pileo carnosus, e convexo plano, lacteo, dein æruginoso oriente; lamellis ex albido fuscescentibus.

AGARICUS SAUNDERSII.—*A. (Entoloma) majalis*, Saund. & W. G. Sm. Myc. Ill., t. 46, non Fr.—*Entoloma* pileo carnosio, marginem versus tenui, convexo, glabro, viscido (?), albicante; stipite solido, firmo, æquali, glabro, albo; lamellis leviter adnexus latis, distantibus, incarnatis.

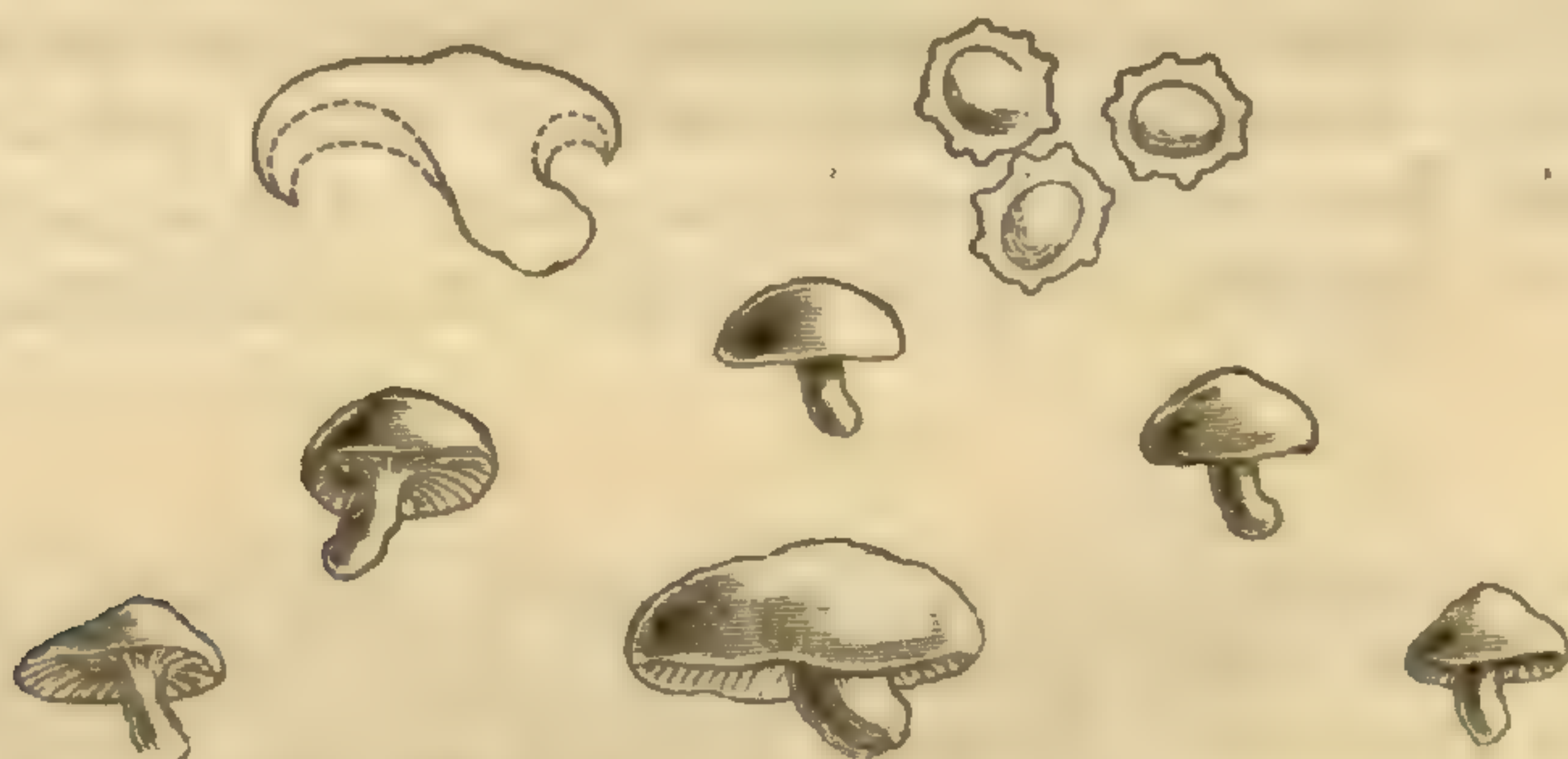
A. majalis singulim ab *A. Saundersii* differt præcipue statura gracili, stipite fistuloso, pileo membranaceo, scissili campanulato, cinnamomeo; lamellis liberis confertis crenatis.

[The names only of both these species have been already published in *Grevillea* for February last, pp. 127, 128.—*Ed. Journ. Bot.*]

LACTARIUS MINIMUS, *Sp. Nov.*

BY WORTHINGTON G. SMITH, F.L.S.

It is difficult to decide whether this plant should be published as a *bond fide* new species, or be considered a mere depauperised form of some other *Lactarius*. As far as my knowledge goes, no species or variety coming under this genus has hitherto been observed possessing such insignificant dimensions as the plant here figured, which I found in tolerable plenty in a small wood by Coldbrook Park, Abergavenny, on Oct. 16, 1871. Its general characters, excepting of course its minute dimensions (here figured the exact size of nature), accord tolerably well with *Lactarius pallidus*, Fr., but it differs in having a semi-umbonate pileus in place of the depressed cap of that species; moreover it is hardly conceivable that such a fine Agaric as *Lactarius pallidus*, Fr., with a pileus generally averaging from three to six inches in diameter, could ever, under any circumstances, dwindle into such a dwarfish object as our Abergavenny plant. It seems more reasonable to look upon it as a new species, which from its minute dimensions, and perhaps its rarity, has been hitherto overlooked. The fruit is quite normal, and very similar to that of other *Lactarii*.



LACTARIUS MINIMUS, *sp. nov.*—Minute; pallid clay-colour throughout; pileus from one-quarter to five-eighths of an inch in diameter, fleshy, pulvinate, rounded or slightly umbonate, margin incurved; gills subdecurrent, arcuate, branched, moderately distant; stem very short, generally excentric; milk abundant, white, mild; spores echinulate, .0003 in. diameter.

SHORT NOTES AND QUERIES.

PHYSCIA INTRICATA.—It may be interesting to some of the readers of this Journal to know that the rare and singular Lichen, *Physcia intricata*, Schær., still grows in the locality in which it was found by Mr. Borrer, near Hastings, in tolerable abundance. It is to be seen on the perpendicular sides of blocks of sandstone, near the top of the cliffs, and is generally partially covered with the earthy detritus washed down by the rain. It appears to prefer those portions of the cliff which from their firmer nature have resisted the action of the rain and frost, and are consequently somewhat weatherbeaten. Fortunately it is not likely to be exterminated by over-zealous botanists or rarity hunters, for the places in which it is most luxuriant are so inaccessible, on account of the friable nature of the cliff and the insecure foothold which the water-worn ledges of sandstone afford, and from the frequent landslips which take place, that no one but a professional robber of sea-birds' nests would attempt to reach them. This Lichen is also stated to occur at Selsey Bill, but I searched for it there in vain. The soil appears to be somewhat similar to that of the cliffs at Hastings, consisting of a mixture of sand and stiff clay; but there are no cliffs for several miles around Selsey, and I suspect that the two localities given in that neighbourhood are identical, as I have a specimen obtained from Bracklesham near Selsey. The only other British locality given in "Leighton's Lichen-Flora of Great Britain" is Bolt Head, in Devonshire; but the geological formation there is totally different, and I have reason to believe that that locality should have been appended to *Physcia leucomela*, Mich., which does occur there sparingly.—E. M. HOLMES.

ALLIUM TRIQUETRUM.—On Friday, May 30, I visited a plantation at Antron, about two miles west of Helston, in search of *Allium triquetrum*, and was gratified by finding it in great plenty. I found it several years ago here and at Nansloe, near the Loe pool, and it is undoubtedly indigenous.—JAMES CUNNACK.

CLAYTONIA PERFOLIATA is completely established on a bank at Yately, Hants. About a quarter of a mile off is the garden of a house, whence it must have made its escape; but as the hedge-bank is covered with it for two hundred yards, it is quite naturalised there.—C. W. PENNY.

RANUNCULUS CHÆROPHYLLUS, L.—I have met with *Ranunculus chærophyllus*, L., in small quantity, in a second locality, west of St. Brelade's Bay, about two miles from the other habitat. It was growing with *R. bulbosus*, amongst grass, on uncultivated ground covered with *Ulex europæus*, near and about 200 feet above the sea. There is no prospect of getting fruit from either locality this year, as the season has been latterly so dry. Some promising plants which I had noted are dried up. But I hope to send you fruit from plants in cultivation, in which state they grow freely, and produce numerous offsets. A

single plant in a pot has been the parent of sixteen such, three of which are now flowering. At present the heads of fruit are almost spindle-shaped, not cylindrical and truncated, as in the French specimens figured in the "Journal of Botany" for August last. I am looking for *Juncus pygmaeus*.—MARTIN M. BULL.

PLANTS OF CO. CORK.—During a trip last summer made to the neighbourhood of Kinsale, I noted the following plants, all of which possess some local if not general interest:—*Carex punctata*, which, as already noted in the Journal, was found by me growing by the shore at Oysterhaven, close to Kinsale, a station which greatly extends the range of this rare species in this county. *Asplenium lanceolatum* I saw growing near the old fort, opposite the town of Kinsale, a new station for this interesting species. Near the same locality grows *Lepidium latifolium* by the water, and one or two plants rare in the county (Cork), though not generally so, viz., *Salvia Verbenaca*, *Torilis nodosa*, and very abundant (growing in the short grass), *Linaria Elatine*. In cultivated fields I found *Valerianella Auricula*, a species apparently not very rare in this county, and no doubt often confounded with *V. dentata*. *Sclerochloa distans*, a grass noted as rare in the "Cybele," though perhaps not so in South Cork, grows freely in one spot by the road to Scilly (Kinsale).—H. F. ALLIN.

ON THE FRUIT OF *LYSIDICE RHODOSTEGIA*.—Having been so fortunate, in July last year, as to gather on the banks of the West River, in the Sam yeung Pass, opposite the village of Tai seung, about ninety miles above Canton, specimens with nearly ripe fruit of this very interesting plant, described by me six years ago (Seem. Journ. Bot. v., 298), I am now enabled to complete the generic character, thus:—Legumen stipitatum, rectum, plano-compressum, coriaceo-lignosum, bivalve, apice rigide uncinato-acuminatum, sutura inferiore vix, superiore paululum incrassata. Semina 9—12, transversa, isthmis incompletis spongioso-cellulosis separata, oblique ovalia, valde compressa, margine incrassato angusto cincta, exarillata; albumen nullum; cotyledones planæ, tenues, carnosæ; radícula brevissima, recta, inclusa. The pod is eight inches long, and one and-a-half inch wide. Its nearest affinity, as before stated by me, seems undoubtedly with the South American genus *Heterostemon*, Desf.—H. F. HANCE.

NOTE ON *GLOCHIDION? CINERASCENS*, Miq.—This plant passed through my hands when lately examining my Burmese *Phyllanthi*. The strange habit and different arrangement of foliage made it at once a very suspicious member of the *Euphorbiaceæ*, and an examination of its fruits only confirmed my view. Dr. J. Mueller, in the second part of the xv. vol. of DC. Prodrômus, p. 314, takes in the species as *Phyllanthus cinerascens*, Müllbrg., but he had no fruits at command. I myself feel a little doubtful, having only two fruits at disposal, whether to place the plant in *Ilicineæ* or in *Rhamnaceæ*; but I am

inclined to consider it an *Ilex*, with which the structure of the leaves and the whole habit correspond. The fruits are said to be 3-coccos, but I should call them 3-spermous; unfortunately the contents are all eaten up by insects. The epicarp is fleshy, and the "disk" under the fruit resembles more that of *Ilex* than *Rhamnaceæ*. There are only two genera in *Rhamnaceæ* (provided this should not be a new genus) with which the plant can be compared, viz., *Rhamnus* and *Scutia*, the former containing more temperate forms, the latter differing greatly in habit. Whilst drawing up these remarks I have come upon an *Alphitonia* from the Moluccas, cultivated in the Buitenzorg Garden in Java, named *Alphitonia incana*, Teysm. et Binnend. I can find no description of this species, nor can I find the name, in Teysmann's and Binnendyk's catalogue of the plants of the Buitenzorg Garden. There is an *Alphitonia Moluccana*, T. et B., and I suspect the authors have afterwards changed their own name, and, if so, very unfortunately so, as will be seen from the sequel. A comparison with Roxburgh's description and excellent MS. figures has clearly shown me that *Rhamnus incanus*, Roxb. Fl. Ind. I., 603, and *Alph. incana*, T. et B., are one and the same plant.—S. KURZ.

CALAMINTHA SYLVATICA, Bromf., IN DEVON —Lately, whilst turning over some unarranged plants, two specimens of *Calamintha* gathered by myself at Torquay in 1864 attracted my attention, and on handing the plants to my friend the Rev. W. W. Newbould, he immediately recognised them as *Calamintha sylvatica*, Bromfield. In Eng. Bot. Sup., pl. 2897, a good figure of the plant is given, and Dr. Bromfield writes that "Mr. Woods has collected a plant in Kent which he considers identical with the present; and as far as can be judged of from the single and not very good specimen seen by us, we are disposed to coincide with that gentleman and our kind friend Mr. Borrer in thinking them the same." I have looked for this specimen in Mr. Woods' Herb, but only one plant of *Calamintha* is labelled from Kent, and this is undoubtedly *C. ascendens*, Jord. (*C. menthifolia*, Syme Eng. Bot., ed. iii) *C. sylvatica* has not hitherto been recorded from any other station besides the Isle of Wight, and its occurrence on the mainland at Torquay leads one to expect its existence elsewhere in the South and South-West, and it should be carefully looked for this season.—F. TOWNSEND.

MIDDLESEX PLANTS.—By the canal side, leaving West Drayton Station, in the direction of Uxbridge, I observed *Smyrnium Olusatrum* in the hedge of the towing-path, near, however, to a farmyard. This would be say half-a-mile from the station; a little nearer *Carex axillaris*, *C. pseudo-Cyperus*, and *C. paniculata* grew by the margin of the stream. *Enanthe fluviatilis*, *Myriophyllum verticillatum*, and *Ranunculus circinatus* are fairly abundant in the canal. In a brickfield between West Drayton on the London side and Hayes Station, I gathered a plant of *Erigeron acre*. There was nothing suspicious in the station in itself, but of course this occurrence alone must not establish this as a native Middlesex plant. At a place called Colham Green, in

the same neighbourhood, occurred *Carex divulsa*, *Euonymus europæus*, *Clematis Vitalba*, and in several places on walls about Dawley I saw *Festuca pseudo-Myurus*, and the *brachycarpa* variety of *Draba verna*. The *Trigonella* near Hillingdon Place Lodge was in nice flower.—J. L. WARREN.

ORCHIS PALUSTRIS, *Jacq.*, IN GUERNSEY.—Towards the end of May, 1871, having written to Dr. B. Collenette, of Guernsey, for some specimens of *O. laxiflora*, I received from his son, Dr. A. Collenette, a very few specimens which agreed fairly well with that species, though differing as to nervation of petal and some minor particulars, and in physiognomy receding in the direction of *O. mascula*, though much laxer of spike. Singularly enough, in June last (1872) I collected a few specimens of an Orchid precisely identical with the Guernsey plant upon dampish *débris* on the extensive mounds and flats north of Hartlepool, known as the Ballast Hills. This ballast was evidently of recent origin, third or fourth year's ballast, and obviously introduced from France or the Channel Islands, for here the Orchid grew along with *Sinapis Cheiranthus*, *Bromus maximus*, *Cynosurus echinatus*, *Lagurus*, and such like aliens. (I may say that several Orchids occur occasionally in this way upon the ballast, and a few have obtained a permanent footing.) I sent specimens of the Guernsey plant to Dr. Syme for the Bot. Exch. Club, having previously distributed examples to several other botanists. Dr. Syme identifies my plant with *Orchis palustris*, *Jacq.*, a distinct species according to Koch and Woods, and one not unlikely from its Continental distribution to be found in the Channel Isles. I have written to Dr. A. Collenette for fuller particulars as to the locality, &c., of the plant he gathered for me, and fresh specimens from the same spot. He wrote at the time that it was "common in certain marshy meadows." Dr. Syme adds to his note giving me the name of my find here, that it is "*not* the *laxiflora* of Jersey and Guernsey," which seems to imply that what it *is* has not been recognised hitherto as a native of those islands. I send you half of the specimens I originally received from Guernsey for your opinion.—F. ARNOLD LEES.—[The plants sent are intermediate in their characters between typical *O. palustris*, *Jacq.*, and *O. laxiflora*, and are one of a chain of forms which connect the two plants, which can therefore be scarcely separated even as varieties. The points relied upon for their discrimination are the length of the central lobe of the labellum relatively to the lateral lobes, and of the bracts relatively to the ovary. Extreme *O. palustris*, such as is published in Billot's *Exsicc.*, n. 1069, possesses a very large labellum, with its central lobe longer than the lateral, and the bracts greatly exceeding the ovary. Grenier and Godron remark that, in drying, the flowers of *O. palustris* remain rose-coloured, whilst those of *O. laxiflora* become of a dark purple. This test would put Dr. Collenette's Guernsey plant into the latter form. Probably the forms grow intermixed there.—*Ed. Journ. Bot.*]

Extracts and Abstracts.

REPORT FOR THE YEAR 1872 OF THE HERBARIUM AND LIBRARY OF THE ROYAL GARDENS AT KEW.

BY J. D. HOOKER, C.B., M.D., F.R.S.

HERBARIUM.

THE accessions to the Herbarium are of exceptional importance as regards novelties. The number of specimens acquired during 1872 has been about 17,500, of which 1500 were purchased, and the rest procured by gift or exchange. Among the most valuable presentations are the Rev. C. New's plants, collected on the Alpine zone of Kilima-njaro, the only hitherto visited snow-clad mountain in equatorial Africa, which possesses a remarkable interest, as the flora of the Alpine zone of Africa was previously wholly unknown. A notice of it is being prepared for immediate publication. A fine collection of 2000 Brazilian plants from M. Glaziou, Director of Public Parks, &c., at Rio de Janeiro. A beautiful collection of Appalachian Mosses has been received with many other plants from Dr. Gray, of Cambridge, U.S., and of Mexican and New Caledonian plants from the museum of the Jardin des Plantes, Paris. The very valuable Herbarium of Dr. Rottler, made by himself and the early missionaries in India, has been presented by the authorities of King's College. As containing the types of many species imperfectly described by the first Indian botanists, and representing the state of the botany of the Peninsula at the beginning of the century, it is of great interest and importance both in a scientific and historical point of view.

A beautiful collection of Burmese Orchids has been presented by the Rev. C. Parish. Dr. Brandis, F.L.S., Conservator of Forests for India, has placed his herbarium, formed in many parts of India, at the disposal of this establishment, to be selected from; together with a collection of Tibetan plants, made by the Rev. Mr. Heyde. Mr. Kurz, Curator of the Herbarium of the Calcutta Botanic Gardens, has transmitted large Burmese collections made during a late mission to that country.

For novelty as well as interest no contributions are of greater value than Beccari's Bornean plants, amounting to 1850 species, communicated by Professor Parlatore, of Florence; M. Maximowicz's Japan plants, a splendid series; Dr. Henderson's collections, made during Forsyth's mission to Yarkand; and Dr. J. Anderson's, made during the expedition to Yunan, the botany of the two latter countries having previously been wholly unknown to science.

The other principal contributions to the Herbarium have been the following:—

EUROPE, &c.—Andersson, Dr. (Academy of Science at Stockholm); Arctic plants. Ball, J.; Alpine plants. Braun, Prof.; a collection of Marsileas. Cooke, M. C.; British Fungi (purchased). Fries,

Prof. T.; Arctic plants, Lichens, &c. Geheeb, A.; Rhine Mosses, Janka, Victor von; Turkey and Banat plants (purchased).

ASIA.—Aitcheson, Dr.; Panjab plants. Beddome, Major; Peninsula of India. Dyer, Prof. T.; Persian plants. Ferguson, W.; Algæ of Ceylon. Maingay, Dr.; a large collection of Malayan and other Lichens (purchased). Parish, Rev. C.; Burmese Orchids. St. John, Major; Persian plants. Stewart, Dr.; N.W. Indian and Tibetan plants. Thomson, Dr.; Plants of Aden, Canara, &c.

AFRICA AND ITS ISLANDS.—Baines, T.; a valuable herbarium of plants from the interior of Tropical S. Africa. Baker, Miss; Madagascar plants. Blackmore, T.; Marocco plants. Barber, Mrs. M. E.; plants from the S. African diamond-fields. Bolus, H.; plants from the interior of the Cape district. Buchanan, Rev. J.; Natal Ferns. Horne, J.; Seychelle Islands plants. Hutton, H.; collections made on the Orange river. Kirk, Dr., Vice-Consul; plants from Zanzibar and the opposite coast. Lange, Prof. (Copenhagen); Schousboe's Marocco plants. Masters, Dr.; Stewart's Mozambique plants. Melliss, J.; St. Helena Lichens and Algæ. McLea, J. H.; S. African Mosses. McOwan, Principal, Somerset East; S. African plants. Pike, Col. (U.S. Consul); Mauritian Algæ.

AMERICA.—Bebb, S.; N. American Willows. Bernouilli, Dr.; Guatemala plants. Cunningham, Dr.; Patagonia and Brazil plants. Gilbert, M.; Monte Video plants. Horticultural Society, Royal, of London; Weir's tropical American collections. Jardin des Plantes, Paris; Mexican plants. Jameson, Dr.; Argentine Republic. Lefroy, Gen.; Bermuda plants. Levy, P.; Nicaragua plants (purchased). Longman, W.; Rio de Janeiro plants. Olney, S. T.; American Carices. Patin, C.; New Granada, &c., plants. Veitch, Messrs.; Endress' Costa Rica collection. White, R. B.; New Grenada plants.

AUSTRALIA, NEW ZEALAND, AND PACIFIC ISLANDS.—Cheeseman, T. F.; New Zealand plants. Dickie, Prof. (Aberdeen); Pacific Algæ. Hillebrand, Dr.; Sandwich Islands collections. Horticultural Society, Royal, of London; a large collection of Gunn's Tasmanian plants. Jardin des Plantes, Paris; New Caledonian collection. Moore, C.; Lord Howe's Island Palms, Ferns, &c. Mueller, Baron von; many Australian novelties. Powell, Rev. T.; Samoan Islands collection.

LIBRARY.

By order of His Grace the Secretary of State for India, a complete set of the Trigonometric Survey, Revenue, and other maps of India, consisting of 174 sheets, mounted and enclosed in lettered cases, has been presented to this establishment. This is of the utmost value in reference, not only to the vast Indian herbarium now collected at Kew, but to the agricultural statistics, and distribution of Indian forests, and many other matters which engage the attention of the Indian botanists habitually working here, whether in the preparation of Floras, or of reports on botanical, agricultural, and forest subjects, for the supreme and local governments of India.

The classified collection of drawings of plants has been largely increased by donations, including a valuable set of drawings of Burmese Orchids from the Rev. C. Parish. The collection is of great

value for facilitating the naming of the living plants in the garden, and those sent by horticulturists, which arrive in large numbers, throughout the summer months especially.

OFFICIAL REPORT FOR 1872 OF THE DEPARTMENT OF BOTANY IN THE BRITISH MUSEUM.

BY WILLIAM CARRUTHERS, F.R.S.

DURING the past year the work of incorporating in the General Herbarium the plants that had been mounted and named, but from want of cabinet space had not been inserted in their places, has been actively carried on. Notwithstanding the great additions made for the accommodation of the Herbarium little more than a year ago, the cabinets have already become so crowded as seriously to interrupt this important work. The necessity is becoming more and more pressing of increasing the accommodation for the arranged Herbarium, in order that there may be space not only for the current additions to the collections, but sufficient also for the valuable sets of plants which still remain only partially arranged in the store cabinets of the Department.

The work of incorporating the extensive additions to the Herbarium which has been carried on during the past year has necessitated the re-arrangement of many of the Natural Orders, and the following have accordingly been revised:—*Malvaceæ*, *Saxifragaceæ*, *Ericaceæ*, *Epacrideæ*, *Gentianaceæ*, *Polemoniaceæ*, *Solanaceæ*, *Orobanchaceæ*, *Globulariaceæ*, *Gramineæ*, *Lycopodiaceæ*, and *Fungi*.

The following collections have been either entirely or in part incorporated in the General Herbarium:—The plants of Corsica, collected by Mabilie; of the neighbourhood of Odessa, by Rehmann; of Lebanon, by Captain Burton; of Persia, by Loftus; of the Malay Peninsula, by Maingay; of North Africa, by Paris; of Abyssinia, by Schimper; of New Caledonia, by Pancher; of Oregon, by Hall; of California, by Hartweg; of Mexico, by Sello; of Martinique, by Sieber; of Demerara, by Appun; and of Brazil, by Weir. In addition to these, extensive selections have been made from Nuttall's Herbarium of North American plants, from Wallich's, and from Hooker and Thomson's Indian collections.

Important contributions having been made during recent years by purchase or presentation to the British Herbarium, the arrangement and critical naming of this valuable collection of British plants have been continued. The following Natural Orders have been carefully examined and re-arranged:—*Violaceæ*, *Polygaleæ*, *Hypericaceæ*, *Malvaceæ*, *Lineæ*, *Geraniaceæ*, *Euphorbiaceæ*, *Leguminosæ*, *Rosaceæ*, *Dipsacaceæ*, *Compositæ*, *Campanulaceæ*, *Gentianaceæ*, *Borragineæ*, *Scrophularineæ*, *Plantagineæ*, *Labiataæ*, *Plumbagineæ*, *Polygonaceæ*, *Lilaceæ*, and *Lichenes*.

The following are the principal additions to the collections of the Department during the year 1872:—

I.—*To the Herbarium.**General Herbarium.**Phanerogamia.*

1800 Species of the rarer plants of France; collected and named by Jordan, Kralik, Grenier, &c.

650 Species of plants from Castile, Spain; collected by Graells.

385 " " from Northern Italy; collected and named by Cesati, Caruel, Savi, &c.

34 " " collected in Italy, and presented by Dr. Trimen.

350 " " from Corsica; collected by P. Mabilie.

150 " " from Crete; collected by Sieber.

187 " " from Malta and Italy; collected and presented by J. F. Duthie, Esq.

405 " " from the Tyrol and Central Europe; collected and named by Huter and others.

191 " " from Cherson, Russia; collected and named by Rehmann.

100 " of Scandinavian *Hieracia*; named by Lindeberg.

870 " of *Compositæ*; chiefly from the collection of the late Dr. Schultz-Bipontinus.

A very extensive Herbarium of the species and varieties of European Roses; collected and named by Chabert, Gandoger, Puget, &c.

40 Species of plants from Lebanon; collected and presented by Captain Burton.

270 " " from the Province of Agow, Abyssinia; collected by Schimper.

100 " " from North Africa; collected by Col. Paris.

880 " " from New Caledonia; collected by Pancher.

100 " " from Tasmania.

90 " " from Martinique; collected by Sieber.

110 " " from Cuba; collected by Ramon de la Sagra.

48 " " from Costa Rica; presented by H. J. Veitch, Esq., F.L.S.

633 " " from Oregon; collected by E. Hall.

131 " " from Demerara; collected by the late C. Appun.

74 " " from New Granada; and

51 " " from Brazil; collected by J. Weir.

225 " " Cordova, La Plata; collected by E. Fielding.

A large collection of plants forming the principal part of the Herbarium of J. A. Murray, formerly Professor of Botany at Göttingen, and editor of the fourteenth edition of Linnæus' "Systema Vegetabilium."

Cryptogamia.

A collection of Ferns from Natal; collected by Col. Bolton, and presented by Dr. J. E. Gray.

600 Species of Cryptogamic plants from Switzerland; collected and named by Wartmann and Schenck.

100 " Cryptogamic plants from Italy, being two fascicles of the "Erbario Crittogamico Italiano."

- 50 „ European Hepaticæ; named by Rabenhorst.
 150 „ Mosses from Scandinavia; collected and named by Hellbom.
 100 „ „ of Europe; prepared by Rabenhorst.
 280 „ „ and Hepaticæ from Australia.
 200 „ Lichens from Scandinavia; named by Th. Fries.
 100 „ „ from Lapland; collected and named by Hellbom.
 550 „ „ from Lapland, forming Nerike's "Laf-Vegetation."
 25 „ European Lichens; prepared by Rabenhorst.
 21 „ Lichens from Australia.
 64 „ „ from New Granada; collected by J. Weir.
 40 „ „ from Uruguay.
 300 „ Fungi from Austria; collected and named by Thümen.
 207 „ „ from America, &c.
 100 „ European Fungi; prepared by Rabenhorst.
 Specimens of *Pachyma Cocos*; presented by Daniel Hanbury, Esq., F.R.S.
 250 Species of Algæ from Scandinavia; collected and named by Areschoug.
 80 Species and varieties of *Characeæ* from Scandinavia; collected and named by Nordstedt and Wahlstedt.
 50 Species of European Algæ; prepared by Rabenhorst.
 6 „ Algæ from Barbadoes; presented by Professor Dickie.
British Herbarium.
Phanerogamia.
 20 Species of rare plants; collected and presented by the Rev. J. E. Leefe.
 30 „ of plants; collected and presented by Mr. J. Britten.
 25 „ of critical plants; presented by Dr. Trimen.
 25 „ of Salices; forming the third fascicle of Leefe's "Salices Exsiccatae."
Cryptogamia.
 100 Species of Lichens; collected and named by the Rev. J. M. Crombie, M.A.
 350 „ Fungi; being the complete series of Berkeley's "British Fungi."
 200 „ „ being the fourth and fifth fascicles of Cooke's "Fungi Britannici."
 100 „ „ collected and named by M. C. Cooke.
 41 „ Algæ; collected by the late Jonathan Couch, F.Z.S.

II.—To the Structural Series.

Fruit Collection.

- 3000 Species of Seeds and Fruits from Australia.
 Male and female Cones of species of *Macrozamia* and *Encephalartos*; presented by William Bull, Esq., F.L.S.
 Female Cone of *Bowenia*; presented by H. J. Veitch, Esq., F.L.S.
 Fruit of a *Lecythis* from Demerara.

27 Species of Fruits from Tucuma, Argentine Republic.

2 Pine Cones and 8 different Fruits from Costa Rica.

19 different Fruits from Cordova; collected by E. Fielding, Esq.

Cones of 12 Species of Coniferæ, from Japan and California; presented by H. J. Veitch, Esq., F.L.S.

General Collection.

276 different Woods from Java; presented by Dr. R. H. A. Scheffer, of Buitenzorg.

A fine stem of *Encephalartos*; presented by Thos. Moore, Esq., F.L.S.

Stems of nine arborescent Ferns; presented by H. J. Veitch, Esq., F.L.S.

Stems of *Cyathea Serra* and *Dicksonia squarrosa*.

Stem of *Dendrobium taurinum*.

Stems of *Borassus*, *Cocos*, and *Areca* from India.

A large rhizome of *Nuphar lutea*, 20 feet in length; presented by Joseph Beck, Esq.

Stems of two species of *Cactus*; presented by Captain Tyler, F.L.S.

Specimens of a very large stem of Ivy; presented by Mr. J. Corke.

Specimens of germinating seeds of *Lemna gibba*; presented by F. C. S. Roper, Esq., F.L.S.

III.—*To the Fossil Series.*

18 Specimens of mesozoic plants, and one specimen of a palæozoic plant; collected and presented by Dr. W. G. Atherstone.

12 preparations of plants from the carboniferous rocks at Burntisland, Scotland.

A specimen of *Cycadeoidea pygmæa*.

Specimens of 10 dicotyledonous woods, and of a Palm from the Red Crag of Woodbridge.

24 specimens of secondary plants from Hastings; collected and presented by Professor Rupert Jones, F.R.S.

76 specimens of plants from the carboniferous rocks at Slamannon Bathgate, and Falkirk; collected by C. W. Peach, Esq.

Nine microscopic sections of *Halonina regularis*.

55 preparations of plants from the carboniferous rocks of Yorkshire.

The number of visits paid during the year to the Herbarium for the purpose of scientific research was 1352. The following foreign botanists may be specified as having used the Herbarium in prosecuting their various studies:—Wittrock, of Upsala, for his Algological researches; Kanitz, of Klausenburg, for his investigations into the *Haloragææ* and allied plants; Reichenbach, of Hamburg, for his work on *Orchideæ*; De Candolle, of Geneva, for his memoir on *Meliaceæ*; and Nathorst, of Lund, in his investigations into Tertiary and Post-Tertiary Plants. Of botanists residing in Britain who have made use of the Herbarium, the following may be specified:—The late Dr. Welwitsch, for his work on the Flora of Angola; Mr. J. Miers, for his memoir on *Lecythideæ*; Mr. G. Bentham, for his "Flora Australiensis"; Mr. W. P. Hiern, for his monograph of the *Ebenaceæ*, and his memoirs on the *Scrophularineæ* for the Cape Flora, and on the *Umbellifereæ* for the "Flora of Tropical Africa"; Prof. Dyer, in his examination of the *Ternstræmiaceæ* and *Dipterocarpeæ* for the Indian Flora; Dr. Masters, for his memoir on *Aristolochiææ*;

Mr. A. W. Bennett, for his work on *Polygalaceæ*; Mr. J. G. Baker, for his memoirs on *Liliaceæ*; Mr. D. Hanbury, for his investigation of officinal plants; Mr. J. Collins, for his report on Caoutchouc; Mr. M. C. Cooke, for his work on Fungi; the Rev. J. M. Crombie, for his publications on British Lichens; Dr. Braithwaite, for his memoirs on British Mosses; Mr. W. G. Smith, for his researches in connection with the "Mycological Illustrations"; and Mr. H. G. Glasspoole, for his intended "Flora of Norfolk."

Notices of Books.

Mission Scientifique au Mexique, Recherches Botaniques publiées sous la direction de M. DECAISNE; première partie, Cryptogamie, par M. EUGENE FOURNIER, avec la collaboration de MM. NYLANDER et BESCHERELLE. Paris: Imprimerie Nationale. (4to, pp. 166, with six plates.)

THIS is the first part of a Flora of Mexico which is intended to be published by the French Government, and which has been planned for the purpose of making known the collections brought home by Bourgeau and other botanists who accompanied the Maximilian Expedition, and of incorporating with them the material previously accumulated at Paris, or to which the authors of the monographs which it contains can obtain access. This first part includes, we presume, all that the work is intended to embrace of the Cryptogamia. The plan followed is to give a complete catalogue of species, with synonyms and localities, mere names only for those known already, but of course full descriptions of novelties. Of the Algæ and Fungi next to nothing was gathered, and they are quite passed over. The Lichens also have been very little worked. Nylander contributes a list of fifty species, nearly all fruticulose or large foliaceous kinds. The paper on the Mosses, which was entrusted to M. Bescherelle, is much fuller. It contains a notice of 400 species, of which a considerable proportion are endemic, and a great many here described for the first time. Unfortunately this part of the work was printed before the author had seen Mitten's "Musci Austro-Americani" (Linnean Journ., vol. xii.), so that his new species and names will need a thorough revision. The great bulk of the present part and all the six illustrations are devoted to Dr. Fournier's paper on the Mexican Ferns. This is a very valuable contribution to Fern-literature. Mexico is extremely rich in Ferns, yielding some four or five hundred species, or perhaps even six hundred, if we take in the Lycopodiaceæ, as is done here. The French collections are much richer than what we have in this country, and Dr. Fournier has studied them all carefully, and indeed has taken great pains to obtain access to all the sets of Mexican Ferns that have been sent to Europe. The Mexican Ferns have been up till now the opprobrium of Fern-literature. The three works especially devoted to the subject, those of Martens and Galeotti, Liebmann and Fée, were all worked up without the opportunity of reference to standard named collections, so that a great many of the common American species

were described in them under new names, and real novelties were very often incompletely characterised, and the synonymy had in consequence become extremely complicated. Dr. Fournier has not made many new species, but he has done what is far better—got together type specimens of the plants described in these three books and carefully compared and studied them; and although he admits as species a large number which we in England should regard as mere varieties, yet he has carefully collated the synonyms, and arranged the species in systematic order in such a way that what was before a perplexing chaos is now in such a state that it is not difficult to form a tolerably clear understanding of what is intended by any particular name, and in doing this he has conferred a boon upon Fern-students which no one can appreciate without actually looking at the paper and seeing what a long list of species which have been proposed he has reduced to the rank of synonyms. His monograph is a great clearing up of a dark subject, and will take its place amongst the standard and indispensable works that treat upon the Ferns of the richest Fern-region in the world. J. G. B.

Lahore to Yārkaṇd. Incidents of the Route and Natural History of the Countries traversed by the Expedition of 1870, under T. D. Forsyth, C.B. By GEORGE HENDERSON, M.D., F.L.S., F.R.G.S., and ALLAN O. HUME, C.B., F.Z.S.

THIS handsome volume, the result of “a friendly visit to the Atalik Ghazi, King of Yārkaṇd, to be regarded in no sense as a mission, and to have no political objects,” is one of general interest to the naturalist and geographer. From the fact that the ground covered by it had been hitherto unexplored, much new material might reasonably have been expected; nor is this expectation unfulfilled. The number of new birds (all admirably figured by Keulemans) is very considerable; while the flora, with which we are principally concerned, although “extremely scanty,” nevertheless furnishes some new species, as well as some important additions to our knowledge of plant-distribution.

The number of plants collected on the expedition (exclusive of Algæ, and including some cultivated species) was 412, of which 215 were found in Yārkaṇd. Of these the following are described as new to science, and figured by Mr. Fitch:—*Hololachne Shawiana*, Hook. f., *Iphiona* (*Vartheimia*) *radiata*, Benth., *Saussurea ovata*, Benth., *Apocynum Hendersonii*, Hook. f., *Deyeuxia anthoxanthoides*, Munro; and indications of others, probably new, but undescribed, are given. The *Hololachne* has supplied evidence of the near relationship existing between that genus and *Reaumuria* in the adnate lamellæ: “these lamellæ, which equally exist in *H. soongarica* [the only species previously known], have hitherto been overlooked by authors; they, however, reduce the technical difference between *Hololachne* and *Reaumuria* to little more than the more numerous stamens and styles of the latter. The mature seeds and embryo, which are hitherto undescribed, agree with those of *Reaumuria*.” The *Iphiona* “differs from the other species of the genus in its radiate capitula,” as well as in the involucre. As a fact of geographical importance, we may note the occurrence of

Cynomorium coccineum, hitherto only known in the Mediterranean region and North Africa. This "was abundant at one spot on the banks of the Arpalak river, fifteen miles above Sanjû, where the Yârkanđ plains begin. At an altitude of about 9000 feet it was found under a dense thicket of *Myricaria* and *Tamarix*, on the roots of which it was probably parasitic."

It is impossible to commend too highly the zeal of Dr. Henderson, who devoted himself throughout the expedition to collecting animals and plants, taking photographs (many of which are here reproduced by heliotype), and making meteorological observations: to his collection the scientific portion of the volume is due.

We must, however, take exception to the statement (p. 2) that "all [the] notes and specimens [of Schlagintweit] were lost to science," after his murder by Wali Khan. His *Labiatae*, *Scrophulariaceae*, *Primulaceae*, *Pittosporeae*, and *Irideae* have been enumerated, and the new species described, in this Journal (vol. vi., pp. 116—127, and 225—250); where also will be found references to other scientific periodicals in which the plants of some other orders have been enumerated.

J. B.

Report on the Caoutchouc of Commerce, being Information on the Plants yielding it, their Geographical Distribution, Climatic Conditions, and the possibility of their Cultivation and Acclimatisation in India. By JAMES COLLINS, F.B.S. Edin. (With two maps, four plates, and woodcuts.)

THE importance to which India-rubber or Caoutchouc has attained as an article of commerce during the past few years, and the fact of its increasing applications, and consequent probable diminution of the supplies, are sufficient reasons why the perpetuation of the plants yielding it should be carefully considered, and if possible their growth and extension encouraged in soils and climates suited to them. Owing to the extent of our possessions in India, attention is of course first directed to that country as being likely to realise satisfactory results in the acclimatisation of the South American rubber-yielding species; and in the report before us, which has been drawn up at the instigation of the Secretary of State for India, attention is likewise directed to the importance of a more careful conservation of the *Ficus elastica*, the source of the bulk of our East Indian supplies. From the attention which the author has previously bestowed on the origin and commercial aspects of the India-rubber supply no one is better qualified to deal with the subject, and he has succeeded in producing a very carefully prepared and elaborate report, the value of which is much increased by liberal quotations and references to the works of Wallace, Bates, Spruce, and others, and by the advantages which the author has had of the opinions of the last-named traveller, and of the late Drs. Welwitsch and Seemann. A few extracts from the book itself will give a better notion of the plan and contents than any words of our own. After a slight sketch of the early history of Caoutchouc, and a description of the laticiferous tissue in which the milky gum is stored, a list showing the general geographical distribution of

the India-rubber-producing species is given. The plants are then treated in the natural orders, those of the Euphorbiaceæ containing the Heveas or Siphonias being first, producing as they do the best kinds of American rubber, known as Para rubber. Then follow the Castilloas, Artocarpeous trees, of which two species—*C. elastica*, Cerv., and *C. Markhamiana*, a new species of the author's—furnish the next best quality. They are known as Ulé trees, and are found in Mexico, Guatemala, Nicaragua, Honduras, Costa Rica, Isthmus of Panama, on the west coast of America, down to Guayaquil, and the slopes of Chimborazo.

Ficus elastica, Roxb., belonging to the same natural order, furnishes Indian or Assam Caoutchouc; and in the Apocynæ we have Pernamubuco Caoutchouc from *Hancornia speciosa*, Muell. arg., Borneo and Sumatran from *Urceola elastica*, Roxb., Madagascar from *Vahea gummifera*, Lam., *V. madagascariensis*, Boj., *V. comorensis*, Boj., and *V. senegalensis*, A.DC. Other African Apocynæ, as *Landolphia owariensis*, P. de Beauv., *L. Heudelotii*, DC., *L. florida*, Bth., and some undetermined species are shown to yield Caoutchouc, also several species of *Willughbeia*, notably *W. edulis*, Roxb., in Chittagong, Silhet, Madagascar, and Mauritius, and *W. martabanica*, Wall., in Martaban and Chittagong.

Part II. is devoted to "The Cultivation and Acclimatisation of Trees yielding Caoutchouc," in which the aspects of the rubber forests, the present precarious manner of collecting, and the necessity of cultivation and conservation are treated. "The Cultivation of *Ficus elastica* and the Improvement of its Caoutchouc," is next considered. In the matter of acclimatisation of Caoutchouc-yielding plants, the Heveas are pointed out as of primary importance. "Seeds of the *Hevea*," we are told, "could easily be procured from the Amazon districts, and their germination ensured on the spot, as probably from the quantity of oil they contain they would rapidly lose this power, oily seeds losing their germinating power quicker than non-oily seeds, owing to oxidation of the oil soon setting in." The report concludes with some practical instructions on the collection and preservation of specimens of Caoutchouc-yielding plants, and a memorandum is added by Dr. Brandis on the Indian aspects of the acclimatisation question.

The two maps show, first, an approximate sketch of the geographical distribution of Caoutchouc-yielding trees, and, secondly the distribution of *Ficus elastica* in Assam. The plates illustrate *Hevea brasiliensis*, *Castilloa elastica*, *C. Markhamiana*, and *Landolphia owariensis*.

J. R. J.

Botanical News.

ARTICLES IN JOURNALS.

Annales des Sc. Nat. (t. xvii., n. 1—3, April).—G. de Saporta, "Revision of the (Fossil) Flora of the Aix Gypsums" (pl. 1—5).—E. Bornet, "Researches on the Gonidia of Lichens" (pl. 6—16).—

Triana and J. E. Planchon, "Prodromus Floræ novo-granatensis" (Geraniaceæ, Oxalideæ, Tropæoleæ, Passifloreæ, Turneraceæ, Papayaceæ).

MAY.

Ann. & Mag. Nat. Hist.—M. J. Berkeley and C. E. Broome, "Notices of British Fungi" (tab. 7—10).

Grevillea.—M. J. Berkeley, "Notices of N. American Fungi" (contd.)—M. J. Crombie, "On the rarer Lichens of Ben Lawers."—M. C. Cooke, "British Fungi" (contd.).

Monthly Microsc. Journal.—R. Braithwaite, "*Sphagnum papillosum*, Lindb., and *S. Austini*, Sullivant" (pl. 16 & 17).

Science Gossip.—G. Gulliver, "Raphides, Sphæraphides, and Crystal Prisms."

American Naturalist.—T. D. Briscoe, "The Winter State of our Duckweeds" (pl. 3).—S. Watson, "New Plants of N. Arizona and Region Adjacent" (28 species; *Chætadelpha*, Gray ms., gen. nov. *Cichoracearum*).

Botaniska Notiser (15th May).—S. A. Tullberg, "Review of the Scandinavian Species of *Batrachium*."—A. L. Grönvall, "Bryological Notes."—V. F. Brotherus, "Excursions round Ponoj" (Lapmark).

Botanische Zeitung.—P. Tomaschek, "On the Law of Development of Diatoms."—E. de la Rue, "On the Histology of the Medullary Sheath of Coniferæ."—B. Hartig, "Note on the Parasitism of *Agaricus melleus*."—G. Briosi, "On the general occurrence of Starch in the Dotted Vessels."—A. Geheeb, "On *Neckera Menziesii* and *N. turgida*, Jur."—Scharlock, "On the Seeds of *Atriplex nitens*, Schk."

Flora.—W. Nylander, "Observata Lichenologica in Pyrenæis orient."—J. Reinke, "On the Rhizomes of *Corallorhiza* and *Epipogon*" (contd.).—S. Kurz, "Note on *Veratronia*, Miq."—E. Askenasy, "On a New Method of Observing the Growth of Plants."—F. Schultz, "Notes on the Flora of the Palatinate" (*Mentha Scribæ*, n.s.).—C. Hasskarl, "Report on the Government Cinchona Cultivation in Java."

Hedwigia.—Venturi, "On *Orthotrichum Shawii*."

Oesterr. Bot. Zeitsch.—W. O. Focke, "On the formation of Species in the Vegetable World" (contd.).—Heidenreich, "The right to specific rank of *Rubus suberectus*, And."—A. Rehmann, "Diagnoses of the known *Hieracia* of Galicia and Bukowina" (contd.).—J. Dedeczek, "Notes on the Flora of the Environs of Prag."—R. v. Uechtritz, "Remarks on Knapp's Pflanzen Galiciens" (contd.).—A. Kerner, "Distribution of Hungarian Plants" (contd.).

The parts of the "Flora Brasiliensis" lately issued are pt. 60, containing the *Olacineæ*, *Icacineæ*, and *Zygophylleæ*, by A. Engler, and pt. 61, containing the first part of the *Euphorbiaceæ*, by J. Mueller.

The local botany of the neighbourhood of the English watering-places has usually a few pages of the "guide-books" devoted to it. As a rule these are the work of quite incompetent persons, but an exception must be made in the case of the well-arranged and comprehensive "Flora of Purbeck," written by a well-known Dorset botanist and published in the "Swanage Guide." The district is a very rich one and of considerable interest botanically.

We are glad to see that the Rugby School Natural History Society is in a flourishing condition. There is not much botany in the Report for 1872, which contains, however, some additions to the Flora, and a paper by the President, Mr. Kitchener, on Pelorianism in *Linaria vulgaris*.

Mr. Kurz, of Calcutta, gives a second instalment of New Burmese plants in the Journal of the Asiatic Society of Bengal (part 2, 1873), comprising descriptions of about 120 species. Two new genera, *Arillaria* (Leguminosæ; = *Sophora robusta*, Roxb.) and *Hemiorchis* (Scitamineæ), are defined in the paper, which is illustrated by three plates representing *Hemiorchis Burmannica*, *Hapaline Benthamiana*, and *Stemona Griffithiana*.

Mr. Geo. Wall, of Ceylon, who is now in England, has printed for private circulation a revised list of the Ferns of that island, adapted to the nomenclature of Hooker and Baker's Synopsis, and incorporating all the recent discoveries. 235 species are now known in the island, of which 28 are confined to it. The catalogue is in folio form, and gives in parallel columns the names of the species and references to the places where they are described and figured in the "Synopsis Filicum," Hooker's "Species Filicum," the two illustrated works on Indian Ferns of Beddome, the "Enumeratio" of Thwaites, and the numbers under which they have been distributed by the latter. This is followed by an account of the local habitats and stations, and a series of remarks on critical and doubtful species.

The forthcoming part of the Proceedings of the Royal Horticultural Society will contain a catalogue by Mr. Baker of all the known species and varieties of *Lilium*, with their synonyms and references to published figures, intended to be checked by growers as a stock list, and in making exchanges and purchases.

We understand that Prof. E. Fries, of Upsala, is preparing a second edition of the "Epicrisis systematis Mycologici," published in 1836—38.

A Flora of the county of Chester, which has occupied the attention of Mr. Warren for many years past, is likely soon to appear. With the object of obtaining assistance from local botanists, Mr. Warren has printed a list of Desiderata and Queries about the plants of Cheshire, which he will be glad to forward on application, and he will be grateful to receive any answers or additional information.—Address Hon. J. L. Warren, 67, Onslow Square, Brompton, S.W.

The publication of the (17th) concluding volume of De Candolle's "Prodromus" is daily expected. We are informed that there will be issued at the same time with the volume the concluding (4th) part of Dr. Buek's Index, an almost indispensable companion to the ready consultation of this great systematic work.

The Botanical Society of France will hold its annual "session extraordinaire" at Brussels this year, under the auspices of the Royal Belgian Botanical Society. The first meeting will be held in the Botanical Gardens on July 9th, at 9 a.m., and the programme includes a visit to the celebrated Hans Grotto and the swamps round Hasselt (of the very rich flora of which M. Crépin has recently published an account), several scientific meetings, and visits to the botanical establishments of Ghent, Liege, Antwerp, &c. English botanists are specially invited to attend, and one can scarcely imagine a more profit-

able mode of spending a holiday. It is to be hoped many of our local botanists will put in an appearance at the hospitable Belgian capital.

We regret much to have to record the death of Mr. James Ward, one of the oldest and most experienced botanists in the North of England. For more than fifty years Mr. Ward made British plants his study, and few of his contemporaries were more accurately acquainted with them, or more devoted to the investigation of the most intricate and difficult tribes. Up to the last, though afflicted with a very painful and crippling disorder, his mind was clear and his love of plants unabated, and he took the liveliest interest in any new discovery, and few things gave him more pleasure, even when suffering from illness, than to receive a specimen of something he had not seen before. Mr. Ward was one of the earliest members of the Botanical Society of Edinburgh; he was also an active promoter of the Richmond Naturalists' Field Club, and of late years a member of the Tyneside Naturalists' Club. He did not often appear in print, which from his accurate and extensive knowledge of plants is to be regretted; but a valuable herbarium belonging to the Richmond Club was mainly formed through his exertions, and to Mr. Ward belongs the principal merit of the "*Salictum Britannicum Exsicc.*," which was edited by the Rev. J. E. Leefe in 1842 and 1843. Mr. Ward's remarks on Dr. Anderson's observations on this work will be found, in conjunction with those of Mr. Leefe, in vol. viii., page 305, of this Journal. Mr. Ward was remarkable for keenness of observation, and rarely failed to find what he was in search of, and never was backward in imparting to his friends a share of his spoils. At different periods in his life he visited Switzerland and Ireland in search of plants, and delighted in cultivating in his garden some of the varieties he had met with during his excursions both at home and abroad. For many years he resided at Richmond, in Yorkshire, where he was engaged in business; but after his retirement from business, for family reasons he removed to Redcliffe House, near Manchester, where, after a long and painful illness, which latterly assumed the form of carditis, he died on the 7th March last, in his seventieth year. It is to Mr. Ward and such quiet, unassuming, but most industrious and persevering life-long students that we owe the materials which in the skilful hands of our great botanical leaders have so altered the face of British Botany since the early days of Smith and Withering.

We last month noted the death of Alexander Irvine. He was born in or about 1792 at Daviot, in Aberdeenshire, and studied at Marischal College, Aberdeen. Early in life he was attracted towards the pursuit of Botany, and when soon after 1820 he came to London he devoted much of his leisure to examining the country round the metropolis. Hampstead Heath, then a rural district enough, yielded him over 600 species, of which he prepared a catalogue, which with his permission was utilised many years after (in 1869) by the authors of the "*Flora of Middlesex.*" His chief botanical companions were Mr. Pamplin and the late Mr. J. S. Mill. Mr. Irvine afterwards went to live at Albury, in Surrey, and subsequently removed to Guildford, where he followed the occupation of a schoolmaster. Whilst at the former place he published, in 1838, his "*London Flora.*" The

title of this was somewhat ill-chosen, as the plants of the whole south-east of England are included in the first part, whilst the second is a complete British Flora; the book contains a great number of original localities, especially in Surrey, and was arranged upon the natural system, at that time by no means in general use. Several papers on local botany were contributed to the "Phytologist" about this period by Mr. Irvine. In 1851 he took up his abode at Chelsea, where he continued to live till his death, making every year a long country excursion. After the cessation of the old series of the "Phytologist," consequent on the death of Mr. Luxford, a new series of that periodical was started, which commenced in May, 1855, with Mr. Irvine as editor. This was maintained, at a pecuniary loss, till July, 1863, when the publisher, Mr. Pamplin, retired from business. With the earlier numbers were given some sheets of a descriptive work on British Botany, which did not proceed far; the material, collected during many years, was however used in the "Illustrated Handbook of British Plants," printed in 1858, in five parts. This was Mr. Irvine's most extensive work, and as a popular text-book possesses many excellent points, and contains a great amount of information in plain language. The order followed is that of Cosson and Germain's "Flore des environs de Paris" reversed; a large number of exotic casuals are included, and the book concludes with a most comprehensive Index, in which a great amount of miscellaneous information is curiously incorporated. Mr. Irvine was always desirous of bringing scientific reading within the reach of all, and in November, 1863, he started a penny monthly journal called the "Botanist's Chronicle," with which was issued also a trade catalogue of second-hand books; this literary curiosity expired after an existence of seventeen months. Only last year a circular announced a new work on British Botany from Mr. Irvine to be in preparation; but the infirmities of age were increasing rapidly, and on May 13th he died, somewhat suddenly, at the age of eighty-one. It is difficult to estimate aright his influence on British Botany. Greatly respected by all, a good scholar, an original writer, and a singularly simple, kind, and truthful character, his zeal for his favourite pursuit may be estimated from his starting one magazine when sixty-three years old and a new one when seventy-one. To all young enquirers and beginners he was unvaryingly kind, and many were helped on at the commencement by him. As a botanist, however, he did not take a high rank; his style was too discursive, and the absence of arrangement evident in all his writings often led to inaccuracies. He possessed an extensive knowledge of the old botanical authors and of plant-distribution. The new series of the "Phytologist" never reached the position of its predecessor, though it perhaps occupied that at which it aimed; for it must be remembered that Mr. Irvine always wrote for the non-scientific, and his efforts to spread among them such a knowledge of British Botany as that which was the great delight and solace of his long life were to a great extent successful. His later excursions were chiefly into Essex, and it is believed that he had made considerable additions to the published Flora of that county.

By the death from pneumonia of W. S. Sullivant at Columbus, Ohio, on the 30th April, the United States lose their most accom-

plished bryologist. He was born at Franklinton, a little village near the site of the present city of Columbus, Ohio, in 1803. He graduated at Yale College in 1823. In 1840 he published "A Catalogue of Plants in the Vicinity of Columbus," and two years afterwards described three new species of Phanerogams in the "American Journal of Science and Art." He then turned his attention to the Mosses, and in 1843 issued, in two quarto vols., the "Musci Alleghanienses," actual specimens with descriptions of the Mosses of the Alleghany Mountains. This was followed by the "Contributions to the Bryology of North America," in the Memoirs of the American Academy for 1846 and 1849. The second edition of Gray's "Manual of the Botany of the North United States" was enriched by a compendious account of the Mosses from Mr. Sullivant, illustrated by eight plates; this was omitted from subsequent editions of the Manual, on the understanding that a separate account should replace it. The published sets of Mosses named by Sullivant comprehend the Musci Boreali Americani of Sullivant and Lesquereux, issued in 1856; Bolander's Californian species, in 1865; Austin's Musci Appalachiani, Wright's Musci Cubenses, in 1861, and several others. The "Icones Muscorum" appeared in 1864, with 129 unrivalled copper-plates of species peculiar to Eastern North America. A supplementary volume was in preparation at the time of the author's death, the plates for which were completed. Mr. Sullivant's extensive bryological herbarium and library are left to the Gray Herbarium of Harvard University, and his name is commemorated in the Saxifragaceous genus *Sul'ivantia*, which he himself discovered in his native State of Ohio. A full memoir, from which we have taken these particulars, will be found in the Annual Report by the Council to the American Academy, May, 1873.

Dr. Rabenhorst, of Dresden, has for disposal some sets of Chinese Lichens collected in the neighbourhood of Saigon, Hongkong, Whampoa, and Shanghai by his son Rudolf, and determined by Dr. Krmelhuber, of Munich. The following is a list:—*Arthonia linearis*, Krphb., spec. nov.; *A. Antillarum*, Fée, f. *spermogonifera*; *A. astropica*, Krphb., spec. nov.; *A. cinnabarina*, form. & var. *adspersa*, (Mont.) Nyl.; *Graphis striatula*, Ach., f. *minor*; *G. tenella*, Ach.; *G. hypoglaucia*, Krphb., spec. nov.; *Verrucaria ochraceo-flava*, Nyl.; *V. tropica*, Ach.; *Pyxine Cocoës*, (Sw.) Tuckerm.; *Lecidea lygea*, Ach.; *L. conspersa*, Fée, sorediifera; *L. internigrans*, Krphb., nov. spec.; *Buellia nigratula*, (Nyl.); *B. discolor*, Hepp.; *Trypethelium Sprengelii*, Ach.; *Pertusaria diducta*, Krphb., spec. nov.; *P. leucop-sara*, Krphb., spec. nov.; *Physcia hirtuosa*, Krphb., spec. nov.; *P. picta*, (Sw.) Nyl.; *P. crispa*, (Pers.) Nyl.; *Lecanora flavo-viridis*, Krphb., spec. nov.; *L. subfusca*, Ach., var. & f. *intermedia*, & var. *chlarona*, Ach., f. *microcarpa*, Krphb.; *Gyrostomum scyphuliferum*, (Ach.) Nyl.; *Parmelia perlata*, Ach.; *P. conspersa*, (Ehrh.) Ach.; *P. Mougeotii*, Schaer.; *P. mutabilis*, Tayl.; *Callopisma aurantiacum*, var. *flavovirescens*, (Wulf.); *Aspicilia Acharii*, var. *ochraceoferruginea*, (Schaer); *Limboria actinostoma*, Fr.; *Bottaria sinensis*, Hpe. et Rabenh., spec. nov. The price is 5 thalers (15s.).

Wanted to purchase good specimens of between 300 and 400 of the rarer British plants, to complete a collection. Apply to J. G. Baker, Kew Herbarium.

Original Articles.

ON THE DISTRIBUTION OF ARCTIC PLANTS DURING THE POST-GLACIAL EPOCH.

BY ALFRED NATHORST, OF THE GEOLOGICAL SURVEY OF SWEDEN.*

My first researches into the Arctic plants found in the post-tertiary deposits were made in 1870, when I obtained in fresh-water beds in the South of Sweden leaves of *Salix polaris*, Wahlb., *S. herbacea*, Linn., *S. reticulata*, Linn., *Dryas octopetala*, Linn., *Betula nana*, Linn., and some others. I prosecuted my researches in the summer of 1871, and was so fortunate as to find the same leaves in similar deposits throughout the whole south-western part of Scania. Sometimes they occurred in such quantities as to form beds of peat in the freshwater sands and clays entirely made up of the leaves and branches of the plants; and here I found also fruits of *Betula nana*, Linn., and plants of *Dryas* with the leaves still attached to the stem. I also made a large collection of Mosses, which have been determined by Dr. Berggren, of Lund, to belong to the following species:—*Hypnum scorpioides*, Dill., *H. fluitans*, Dill., *H. cupressiforme*, Dill., *H. callichroum*, Brid., *H. exannulatum*, Gumb., *H. cuspidatum*, Dill., *H. erysophilum*, *H. Heufleri*, *H. stellatum*, Schreb., *H. Wilsoni*, *H. giganteum*, Schimp., *H. ochraceum*, Turn., *Thuidium abietinum*, Schimp., *Aulacomnion palustre*, Schw., *Tortula muralis*, Timm., *Camptothecium nitens*, Schreb., *Leptotrichum flexicaule*, Schwgr.,

* The results of Mr. Nathorst's investigations into the vegetable remains in the glacial beds of Europe were communicated to the Royal Academy of Sciences of Stockholm in April last by Prof. Torell. We are indebted to Mr. Nathorst for the valuable summary of the important results of his labours printed here. The author had already communicated some of the facts to Sir Charles Lyell, who, in the last edition, just published, of his "Antiquity of Man," refers to them in tracing the gradual changes in the climate of Britain from the warmth of the Coralline Crag to the intense cold of the Glacial period. It had been noticed that the lignite beds which cover the Cromer Forest-bed gradually passed into the overlying boulder clay which represents the period of greatest cold in that district. Reasoning from this, Sir Charles Lyell says, "It occurred to Mr. Nathorst, a skilful Swedish geologist, who visited Cromer section in the autumn of 1872, that the lignite beds of the laminated sands and clays ought to exhibit in their vegetable remains a transition from the comparatively mild climate of the forest-bed to the severe cold indicated by the till; and he was fortunate enough to find the remains of plants becoming more stunted as they occurred higher in the beds, until within half a foot of the boulder clay he found *Salix polaris*, now only known within the Arctic circle, together with a Moss which has been referred by the eminent bryologist Berggren to *Hypnum turgescens*, an Arctic Moss only found living in temperate latitudes on the extreme heights of the Alps."—*Antiq. of Man*, 1873, pp. 261, 262.—[*Ed. Journ. Bot.*]

Philonotis fontana, Brid., *Bryum pallens*, Swartz., *B. pseudo-triquetrum*, Schw., *Amblystegium serpens*, Schimp., *A. filicinum*, Lindb., *Timmia megapolitana*, Hedw., *β. norvegica*, and *Climacium dendroides*, Web. et Mohr. The Liverwort *Metzgeria furcata*, Nees ab Esenb., was also found with the Mosses; and the following animal remains:—*Cytheridea torosa*, Jones, *Pisidium pulchellum*, D'Orb., *P. Henslowianum*, Shepp., *Limnea limosa*, and *Anodonta*. Some leaves and seeds besides those recorded were also found, but I have not yet determined them.

The deposit containing the plant-remains rested on the till or boulder clay (*moraine profonde*), and was therefore formed as the ice-sheet melted away. It is generally covered by beds of peat-moss, from which there have been obtained a constant series of different trees like those which Steenstrup has observed and described in Denmark. It was therefore very important to investigate the beds underlying the peat-mosses in Denmark, and this I was enabled to do, and happily with the assistance of Prof. J. Steenstrup. The results here were the same as in Scania. These will be better understood by the following table, which at the same time shows the changes of climate which followed the glacial epoch:—

Peat with	{	<i>Alnus glutinosa</i> , Wahl.	}	Post-glacial deposit.
		<i>Quercus</i> .		
		<i>Pinus sylvestris</i> , Linn.		
		<i>Populus tremula</i> , Linn.		
		<i>Betula nana</i> , Linn.		
Clay with	{	<i>Betula nana</i> , Linn., <i>Salix herbacea</i> , Linn., <i>S. reticulata</i> , Linn., <i>S. sp.</i> <i>Dryas octopetala</i> , Linn., <i>Salix polaris</i> , Wahlb.	}	Post-glacial deposit.
		Boulder clay.	Glacial deposit.	

The clay might indeed be considered glacial, but as it would be difficult to draw a line of demarcation between the lower or glacial clays and those which are properly post-glacial, I have called all the deposits resting on or above the boulder clay "post-glacial."

In the summer of 1872 I visited Mecklenburg, in Germany, and found leaves of *Betula nana*, Linn., in a peat-moss there. In a peat-moss at Kolbermoor, in the lowland of Bavaria, south from Munich, I found the same leaves at a depth of 8 feet, along with the leaves of *Myrtillus uliginosa*, Drej., *Andromeda polifolia*, Linn., &c. They formed a distinct layer in the moss at this locality, which could be traced throughout the whole of the peat-moss, showing that at one time a surface vegetation covered the ground here similar to that which is found at the present day in Lapland, and Finmark.

In Switzerland I found a great quantity of Arctic plants in a locality on the low ground between Zurich and Bodensee, at Schwerzenbach. The condition of things here was precisely what I had seen

in Sweden and Denmark. A peat-moss with stems and leaves of Oak, Scotch Fir, and Birch covered a fresh-water clay, which rested on the boulder clay. In the clay I found leaves of *Betula nana*, Linn., *Dryas octopetala*, Linn., *Salix reticulata*, Linn., *S. retusa*, Fr., *S. myrtilloides*, Linn., *S. polaris*, Wahlb., *Arctostaphylos Uva-Ursi*, Linn., *Polygonum viviparum*, Linn., *Azalea procumbens*, Linn., and some others. On a second visit I was accompanied by Dr. Keller, of Zurich, and Prof. Heer was so good as to determine the leaves. I hope that he may give a lengthened description of them. I ought to say that I am not quite satisfied that the leaves referred to *Salix polaris* are indeed that species. The specimens of those leaves which I have found in Sweden and Denmark, and also at Cromer in Norfolk, are generally (though not always) closed together, while the leaves at Schwerzenbach were flattened out. It is a singular contrast to the condition of things which prevailed when these plants were growing in this district, to find as I did the hills now covered with the Vine and the Chestnut!

I continued my investigations to England, and there first visited Bovey Tracey, where Mr. Pengelly had in 1861 found leaves which Prof. Heer had determined to belong to *Betula nana*, Linn.* Mr. Pengelly was so good as to accompany me to Bovey Tracey, and show me the locality, and I have to acknowledge the kindness of Mr. Divett, the owner of the coal-mines, in assisting me in my work in every way possible. We found *Betula nana*, Linn., in the original locality, and along with it some fragments of *Salix cinerea*, Linn., but our operations were stopped by heavy rains. In a new locality not far from the other, and within two feet from the surface, we found the *Betula* again, with leaves of different species of *Salix* which have not yet been determined. I have heard from Prof. Heer that he now thinks the *Salix repens*, Linn., of his Bovey Tracey memoir most probably belongs to *S. myrtilloides*, Linn. In this second locality we found also a leaf of *Betula alba*, Linn., a *Potamogeton*, and some seeds and leaves of *Arctostaphylos Uva-Ursi*, Linn., which at the present day is not found in Britain to the south of York and Cumberland.

When in England I also visited the Cromer beds between Cromer and Happisburgh, and here I investigated in two localities the beds between the "forest-bed" and the "boulder clay," and in both places I found some leaves. In the first locality, situated between Mundesley and Cromer, I obtained specimens of *Salix polaris*, Wahlb. together with *Hypnum turgescens*, Jens., immediately above the boulder clay. The other locality was between Mundesley and Happisburgh, where somewhat higher up in the beds, and nearer the "forest-bed," I obtained a large collection of the leaves of *Salices*, and seeds. The Willows appear to belong to *S. hastata*, Linn.?, *S. phylicifolia*, Linn.?, and *S. nigricans*, Smith?; but before determining with certainty these materials it will be necessary to make further comparisons and examinations. The Rev. J. Gunn, of Norwich, was so good as to give me some valuable specimens from the Cromer beds, and he pointed out to me some leaves of *Salix cinerea*, Linn., which

* Heer and Pengelly on the Lignites and Clays of Bovey Tracey. Philosophical Transactions, 1862.

Mr. Carruthers had already shown me in the British Museum collections. It seems, therefore, that we have here a series corresponding to the post-glacial deposits which I have observed elsewhere, and exhibiting in the contained plants the gradual changes of climate from the forest-bed down to the boulder clay.

RECENT RESEARCHES IN THE DIATOMACEÆ.

BY REV. E. O'MEARA, A.M.

VI.

IN the family *Achnantheæ* the valves are symmetrical in the longitudinal axis, but unsymmetrical in the plane of separation; the frustules are more or less geniculate, so that of the valves one is concave while the other is convex; the former only possesses a central nodule. The genera *Achnanthidium* and *Cocconeis* agree in these general characteristics, but are separated into a distinct family, the *Cocconeideæ*, for reasons that shall be hereafter assigned, so that the family *Achnantheæ* embraces the solitary genus *Achnanthes*. The two species of this genus which have been observed abundantly in a living state, *A. brevipes* and *A. subsessilis*, correspond with the *Naviculeæ* in the structure of the cell-contents, inasmuch as they possess a middle granular plasm-mass and two endochrome-plates lying on the girdle-bands, and thence passing over the valves. The endochrome-plates exhibit a slit in the middle, and separate by an incision proceeding from the ends. The well-defined cell-kernel lies always nearer to the concave than to convex valve. In the few specimens of *A. longipes* which came under Dr. Pfitzer's notice, the endochrome-plates were split up into numerous small pieces; but whether this be the normal condition or not remains to be determined.

The marine *A. longipes* was observed by Smith in the act of forming auxospores, the same form, as well as *A. subsessilis*, by Lüders. In respect to the former Smith maintained that a single cell forms two auxospores, Lüders supposed that two cells co-operate to produce the same result; while in the case of *A. subsessilis* a single mother-cell gives birth to a single auxospore. In both cases, according to Lüders, the cell-contents divide and afterwards re-unite, alternately in the case of *A. longipes*, directly in that of *A. subsessilis*. According to Lüders, there is always found a gelatinous sheath surrounding the infant cells, which force themselves out by an opening at the end.

It appears confusing that two species so nearly related should exhibit such different conditions in the formation of their spores, and therefore the author expresses a wish that observers residing near the sea-shore will carefully examine fresh specimens with a view to ascertain satisfactorily the process of spore-formation.

After the *Achnanthideæ* Pfitzer ranges the group *Cocconeideæ*, in which are embraced the two genera, *Achnanthidium* and *Cocconeis*. *Achnanthidium* has been distinguished from *Achnanthes* by the fact

that while the latter is stipitate the former is free. To this Pfitzer adds another mark of distinction founded on the character of the endochrome-plates. *Achnanthes* has two endochrome-plates, while in *Achnanthidium lanceolatum* there is but one, which lies upon the convex valve. This peculiarity places *Achnanthidium* in intimate relationship with the next genus, *Cocconeis*. *Cocconeis Pediculus* at least possesses a single endochrome-plate, occupying a position similar to that of *Achnanthidium lanceolatum*, split up on the edge, and with its scallops reaching the girdle-band. It exhibits also a strong slit on one side, a circumstance which in the author's opinion shows that the *Cocconeideæ* are not decidedly symmetrical in the longitudinal plane. This feature discovers itself in *Achnanthidium* likewise, in the structure of the concave valve, by a stronger development of the central nodule on one side than on the other. The endochrome-plate is more deeply scalloped in proportion as the valve is large. The central incision sometimes extends so far as to effect a complete division of the plate. A cell-kernel is clearly seen in *Cocconeis Pediculus*, as is also a central accumulation of plasm. So the *Cocconeideæ* are essentially distinct from the *Naviculeæ*, and exhibit a decided analogy to the similarly epiphytic *Amphoreæ*, inasmuch as in neither does the occurrence of the longitudinal line exhibit anything to correspond with it in the structure of the primordial cell. In the *Amphoreæ* and *Cocconeideæ* the endochrome-plate stands related to the surface of attachment. The former attaches itself by one girdle-band, and upon this plane lies the middle of the plate; the latter are fixed to foreign bodies by one valve, on which the middle of the plates lies. As respects the formation of auxospores, *Achnanthidium* has never been discovered in the act, but *Cocconeis* has frequently. Carter first found that two cells secrete a gelatinous envelope, open, and by a true act of copulation construct a single spore, which is first globular, then becomes ellipsoid, and finally separates into two longitudinal portions, each of which is an auxospore. On the contrary, Smith maintained that a single cell pours out its contents, and therefrom developes a single spore; but the author adds that while Carter's observations refer to *Cocconeis Pediculus*, Smith refers to what he calls the nearly allied species, *Cocconeis Placentula*. Lüders agrees in this point with Carter, and Dr. Pfitzer confirms their position in regard to *C. Pediculus*. The following differences are noticeable. One supposes the separation has been completed within the envelope, the other not till it has been thrown off. According to Carter the firstling-cells turn the concave sides one to the other; according to Lüders they are parallel. Dr. Pfitzer observes that the material at his command was too young to enable him to decide this question.

Gomphonemeæ.

In this are included three genera—1. *Sphenella*; 2. *Gomphonema*; 3. *Rhoicosphenia*. They are distinguishable by the fact that in the general structure of the valves they resemble the *Naviculeæ*. Like the latter, the frustules possess three nodules on each side, and two median-lines divided into two parts by the central nodule. Still they are unsymmetrically constructed, as the upper end is broader than the lower. As the *Achnantheæ* exhibit a

want of symmetry in the axis of separation, and the *Cymbelleæ* in the longitudinal axis, the *Gomphonemææ* are unsymmetrical in the transverse axis. The two last-named groups are more closely related than has been hitherto believed both in respect to the structure of their valves and also of their cell-contents. On the one side the *Cymbelleæ* so far as they are stipitate show a distinction between the upper and under ends, which is not noticeable in the case of valves exposed to the action of heat or in the free-living forms; and on the other side the *Gomphonemææ* are unsymmetrical not only in the transverse axis, as was before stated, but also in the longitudinal axis. In all, this feature manifests itself in the structure of the primordial cell; in some, in the structure of the valve itself. In *Sphenella vulgaris*, Kütz., the valves are noticeably more decidedly convex on one side than on the other; and in other cases in which the margin of the valve appears symmetrical, the sculpture on the two sides of the longitudinal line is different. Tuffen West's description of *Gomphonema geminatum* in Smith exhibits on one side of the central nodule a group of four or five separate depressions which do not occur on the other side; and this is a regular occurrence. Besides, the median lines at the central nodule and the under end-nodule bend towards the same side—namely, that in which the above-mentioned depressions occur, and which are situated in a well-defined area. At the upper end-nodule the median line at first takes the same bend as at the other nodules, but afterwards changes round to the opposite side, towards a small space in which no depressions occur. These peculiarities render manifest the unsymmetrical character of the valves. In many specimens the median line is bowed, however, slightly, so as to present its concave side to the group of depressions. In addition it is important to observe that where these depressions lie to the right on the upper valve, they are found also on the right in the underlying valve. So that the *Gomphonemææ* are not diagonally constructed as the *Pinnulariæ* are, but unsymmetrically on the homologous sides, like *Anomoeoneis* and the *Cymbelleæ*. The structure of the primordial cell corresponds: there is but one plasm-band situated on the cell wall; only one endochrome-plate occurs; but while the former and the middle of the latter in the *Cymbelleæ* lie on the more strongly-arched, we find them in the somewhat unsymmetrical *Gomphonemææ* (e.g., in *Sphenella vulgaris*) on the less convex girdle-band. The central plasm-mass is not so broad on the one side as it is on the other, on which lie the cell-kernel and the turned-up edges of the endochrome-plate, as is the case in the greater number of the *Cymbelleæ*. The endochrome-plate has the same structure as in the last-named, although its position differs to the extent of 180 degrees. The division of the endochrome-plate proceeds by an incision from the ends. The free edge grows across the valve until the original position has been reached. A transverse section of the *Gomphonema* cell would more clearly represent the relative position of the parts.

The genera *Gomphonema* and *Sphenella* are distinguished from one another only by the circumstance that the frustules in the former are stipitate, and non-stipitate in the latter, which Pfitzer, following Grunow and Rabenhorst, considers an inadequate generic distinction

for this reason, that the stipitate forms occur free and with active motion. As respects the substance of the stipes, it appears in this instance, as in the case of *Cocconema* and *Brebissonia*, in its early stage as a simple, colourless, well-defined gelatinous band; but in its more advanced stage of growth it presents a brownish central thread, surrounded by a broad, colourless investment.

As regards the construction of auxospores, Thwaites informs us that in this genus, as well as that of *Cymbella*, two mother-cells develop two auxospores lying parallel to them. Thwaites made this observation in the case of a species related to *Gomphonema dichotomum*, Sm., in *G. dichotomum*, *G. tenellum*, *G. olivaceum*; Pfitzer in the last-named species. An actual union of the two primordial mother-cells does not occur, but only a diffusing of the contents through the gelatinous investment. When the auxospores have nearly reached their definitive length they develop a fine membrane, within which the valves are formed one after the other. They are at first strongly arched and bent on the longitudinal axis; the striation develops itself clearly in a direction proceeding from the centre towards the ends. The firstling-cells at first have girdle-bands as narrow as those in *Navicula*, the outer larger valve, even in its earliest stage, embracing the smaller inner valve. After the second division, out of the bent-valved firstling-cells spring normal cells with two straight valves, just as in the case of *Navicula*. The plane of separation in the firstling-cell is at a right angle to that of the mother-cell from which it has sprung—the valves of the former being seen when the girdle-band of the latter is turned towards the observer.

Rhoicosphenia.

This may be regarded as a *Gomphonema* unsymmetrical in its three dimensions. In addition to the want of symmetry in the longitudinal and transverse axis, there occurs in this genus a bending in the plane of separation, and also an unsimilarity of the two valves, of which one only—namely, the concave—possesses a central nodule; besides, the fillets which occur on the upper end of *Gomphonema* are here most strongly developed. In the primordial cell no remarkable distinction is found compared with *Gomphonema*; but it is far otherwise with *Achnanthes*, *Achnanthidium*, and *Cocconeis*, to which genera Grunow and Rabenhorst attached it. *Rhoicosphenia curvata* (Kütz.) Grun., and *R. marina* (Kütz.), possess a single endochrome-plate, the middle line of which lies on the plane of one girdle-band, covering the two valves, and even folding itself over upon the other girdle-band. Viewed in this aspect it appears broken into four parts, the division between two of these parts being observable on the F.V. Normally this occurs in a *Rhoicosphenia* lying on one valve on the same side of the upper and under valve. The middle portion of the valves is for the most part covered with endochrome, which is not the case in *Gomphonema*. A slight indentation is observable at the ends of the plate, in which there is an approach to the *Cocconeideæ*, similarly geniculated in the axis of division. The division of the endochrome-plate proceeds just as in the case of *Gomphonema*, towards which genus many transition-forms from *Rhoicosphenia* tend.

The formation of auxospores had been observed by Thwaites in

the case of *R. curvata* so early as 1847. This process goes on precisely as in *Gomphonema*, only the plasm-sac, according to Thwaites, does not emerge at the side, but from an opening at the end of the cell. Smith found the same species and *R. marina* in copulation. In the case of the form last-named, Lüders has added the remark that the auxospores before they have attained the length of the older cells are invested with a very fine silicious coating, which exhibits broad transverse striæ. This investment is at first cylindrical, but becomes bent in the firstling-cells, which issue from it.

ON THE COMPOSITION OF LYCOPERDON GIGANTEUM.

By A. H. CHURCH, M.A.

In the autumn of 1871 some very large specimens of the Giant Puff-ball, *Lycoperdon giganteum*, were obtained from a field in the neighbourhood of Cirencester. Several of these weighed more than 2 lbs. avoirdupois apiece, while others were over 1 lb. The observations by Dr. McNab and myself on the high temperature of these Fungi* were made upon one of the plants now referred to. Afterwards a chemical investigation as to their constituents was undertaken by myself, with the striking results recorded further on—results which are quite in accordance with the earlier analyses performed upon other species of this order.

Previous to analysing the *Lycoperdon* it was dried in a current of warm air. During this process it underwent a curious change. Although the temperature to which it was submitted scarcely exceeded the boiling temperature of water, the mass of the Fungus was observed to glow with a dull red heat, until the whole had become converted into a black charred mass. The final burning was completed in a large platinum tray in a muffle.

The ash thus prepared had the following composition:—

	In 100 parts.
Phosphorus pentoxide (P_2O_5)	46.19
Potash (K_2O)	35.48
Soda (Na_2O)	6.95
Lime (CaO)	2.47
Ferric oxide (Fe_2O_3)	1.08
Silica (SiO_2)	.66
Other substances and loss	7.17
	100.00

Thus it will be seen that the mineral or ash constituents of this Fungus consist mainly of potassium phosphate. We know that both the elements potassium and phosphorus are present in very small

* Gardeners' Chronicle, 1871, page 1256.

quantity in ordinary soils, but are accumulated by plants in considerable quantity, notably in their seeds and most actively growing parts. From what we have learnt of the mode of nutrition of Fungi, they may be regarded as amongst the carnivora of the vegetable kingdom. They probably obtain their food from the stores already accumulated by higher plants, and in this way their extraordinary richness in such elements as phosphorus and potassium may be accounted for. Thus, too, we can understand the increased fertility of the soil inside the "fairy rings" of our pastures, where the last decaying remains of the fungoid mycelium contribute their stores of concentrated and most assimilable nutriment to enrich an extending zone of surface soil. Nor is such enrichment confined to the ash constituents of the plant only. The analysis of the fresh Puff-ball reveals an enormous amount of nitrogenous matter amongst its constituents, and nitrogenous substances have a most marked effect upon the growth of meadow Grasses. I am inclined to think that some of the nitrogen of the *Lycoperdon* exists in the form of nitrates, and that in this way their spontaneous inflammability and high temperature may be explained. But in the following analyses the nitrogen is wholly calculated as albuminoid or proteid matter, since no special determination of the amount of nitrates present had been made.

COMPOSITION OF *Lycoperdon giganteum*.

	In the fresh state.	When per- fectly dry.
Water	90·89	—
Fat, oil and resinous matter	·90	11·00
Albuminoids	5·48	66·78
Cellulose or fungin, &c.	2·10	14·78
Ash or mineral matter	·63	7·44
	100·00	100·00

ON THE AFFINITY AND POSITION OF RYPARIA, *Bl.*

BY S. KURZ.

BLUME in his "Bijdragen," p. 600, has established a new genus under the name of *Ryparosa* (later, in the preface to his "Flora Javæ," corrected *Ryparia*), and placed it in *Euphorbiaceæ*, where it remained until Dr. J. Mueller, in his monograph of that order, ejected it as a foreign element, but without indicating its affinities. While in Java I fortunately collected specimens of the plant in question, and an examination of these, with a consultation of the literature bearing on the history of the genus, has brought out facts which I hope may be interesting to systematists.

The presence of petals, the scales, and the parietal placentation

were data of importance, and could not but lead to the suggestion of the plant being a *Pangiacea*. Of this I soon felt sure, and a comparison with Blume's genus *Bergsmia* showed so many characters in common that I was led to refer to Rumphia iv., t. 178, C., where I found a good figure of my very plant, which is therefore not the true *Ryparia cæsia* of Blume (which has the leaves sparingly adpressed strigose), but what I took at Buitenzorg to be a glabrous long-racemed form of it, and which I now find is Blume's *Bergsmia Javanica*. The differences in character of Blume's *Ryparia* and *Bergsmia* are either based upon erroneous views or relate to variable parts, such as the number of parts in the floral whorls. The filaments are said in *Bergsmia* to be only partially connate, but in this Blume misunderstood v. Hasselt altogether, for he says, "Filamentum centrale, crassum, apice antheras 5 v. 4 biloculares gerens," which is just as in *Ryparia*.

Blume has a *Ryparia cæsia* and a *R. dubia*, and I fear that one of these may represent *Bergsmia Javanica*.

The female racemes are short in both *Ryparia cæsia* and *R. (Bergsmia) Javanica*; but the male racemes are in the former only a foot long, while in the latter they elongate to 2 feet and more. The staminodes are subulate in *R. Javanica*, while those of *Ryparia cæsia* (of which I do not possess the female) are said to be stipitate. The ovary of the one is 1-celled, while that of *R. cæsia* is said to have it 2-celled, a statement which requires to be verified; at least it is not so in my glabrous specimens. The pubescence is a matter of less importance, *R. cæsia* having the branchlets and leaves beneath sparingly covered with adpressed stiff hairs, while *R. Javanica* has only the leaf-buds similarly clothed, the leaves being quite glabrous. I now give a revised character of *Ryparia*, connecting it with *Bergsmia*.

Ryparia, Bl.

Flores dioici, racemosi. Calyx in alabastro globosus, in segmenta decidua 3—4 rumpens. Petala 4—5, oblongo-lanceolata, extus tomentella, coriacea, intus squamulis totidem villosis instructa. Masc.: Stamina 4—5, in columnam tubulosam ovarii rudimentum includentem connata; antheræ 2-cellulares, ovales v. ellipticæ. Fem.: Ovarium staminodiis 4—5 subulatis v. pedicellatis cum petalis alternantibus cinctum, 1 (v. 2?) locale, placentis 1—3 parietalibus 2-pluriovulatis; stigmata 1—3, sessilia, lata et emarginata v. subhypocrepiformia. Fructus (ex Bl.) corticatus, exsuccus, subtomentosus punctatus, monospermus rarius bilocularis dispermus. Arbores v. arbusculæ foliis alternis longiuscule petiolatis (petiolis apice incrassato-geniculatis, subtus vulgo glaucescentibus). Flores parviusculi, pedicellati, in racemos simplices (masculos femineis multo longiores) axillares v. supra cicatricibus secus ramos solitarie v. binatim ortos dispositi.

N.B. *Bergsmia Sumatrana*, Miq. in Suppl. Fl. Sumatr., 389, is really a *Pangiacea*, and I suspect *Hydnocarpus*. I have no specimens. *Bergsmia? acuminata*, Miq. l.c., has cylindrically oblong *ruminate* seeds, and is in my opinion an *Anonacea*, with which also the whole habit corresponds.

A NEW GENUS OF FERNS OF THE TRIBE ASPLENIEÆ FROM THE SOLOMON ISLANDS.

By J. G. BAKER, F.L.S.

Genus DIPLORA. Sorus sausage-shaped, running up the erecto-patent simple vein from the midrib of the frond to its margin, the two equal narrowly strap-shaped valves of the superior membranous indusium meeting in the middle over the raised vein, and bursting open as the sorus matures.



D. INTEGRIFOLIA, *Baker*.—Rhizome wide-creeping, green, angular, woody, naked, under a line thick. Stipe articulated on the rhizome, quite resembling it in colour and texture, under an inch long. Frond membranous, glabrous, naked, green on both sides, entire, linear-ligulate, 9—10 inches long, half-an-inch broad at the middle, obscurely crenato-repand especially near the subacute apex, narrowed gradually at the base; veins distinct, erecto-patent, usually simple, rarely once forked. Sori 100 to 120 to a frond, beginning a short distance from both base and tip, $\frac{1}{4}$ — $\frac{3}{8}$ inch long, $\frac{1}{2}$ inch broad, usually with a space equal to their own breadth between them, rarely crowded.—Solomon Isles, *Mrs. Burnett*, in the herbarium of the late W. S. Macleay, Esq., of Sydney, which has lately been added to the Kew collection, and contains several other interesting novelties from the same group.

Amongst familiar European types it is most like *Scolopendrium*; but here the sori reach uniformly from the midrib of the frond to its margin, and the pair of involucres, instead of springing from two contiguous veins and meeting in the interspace, spring from two sides of a single vein, and quite hide it till they burst open. In its Eremobryoid plan of growth *Diplora* differs from the great mass of *Aspleniums*, and agrees with *A. vittæforme*, Cav., a plant from the same region very similar in habit, upon which Mettenius has founded his genus *Micropodium*, which is precisely *Asplenium* in fructification, but falls into the other of J. Smith's two great divisions of Polypodiaceæ.

ABNORMAL FLOWERS OF CEPHALANTHERA GRANDIFLORA.

BY F. I. WARNER, F.L.S.

DURING a short botanical ramble in the neighbourhood of Sevenoaks in the latter part of June, I gathered several specimens of *Cephalanthera grandiflora* exhibiting very interesting deviations from the usual number and arrangement of the floral organs.

In one instance the three lower flowers in a spike of eight had three sepals of normal size and shape, two lateral petals also quite normal, but instead of one there were *three* lips or labella. In one flower, the lowest on the spike, one of the additional labella was for about half the length of its lower lobe adherent to the column; but in all other respects all three labella were precisely similar to that in an ordinary flower. The columns were of the ordinary size and shape.

In another instance, of which I found two examples, the two or three lower flowers had in place of the ordinary labellum a petal shaped precisely the same as the two lateral petals, and an additional labellum of the ordinary shape on each side, all other parts of the flowers being as usual. A similarly formed flower of *Catasetum* is figured in Masters' "Vegetable Teratology," page 291.

In a third case the labellum was apparently in an intermediate state—the upper part being erect and shaped like the lateral petals, while the lower part was shaped as in an ordinary labellum.

Adopting the generally received theory of Orchidaceous flowers, it is to be observed that the two additional labella in the flowers I have described occupy precisely the place of the two undeveloped stamens of the outer whorl, and a comparison of these flowers with others exhibiting a similar structure will, I think, leave no room for doubt that these organs are in fact abnormally developed stamens.* It is difficult to explain, however, how it is that they appear in this form, and without giving rise to greater alterations in other parts of the flower. If the theory of R. Brown, adopted by Lindley and Darwin,† is correct, which regards the labellum as a compound organ formed of one petal and two petaloid stamens, we should have expected that when the three organs appeared separately they would have taken the form either of three simple petals or of a petal and two stamens. If on the other hand we adopt the theory of Dr. Crüger,‡ who regards the labellum as a simple organ, it would seem very unlikely that these additional organs could have been developed without affecting the size or shape of the column. In all the flowers, however, which I examined I particularly noticed that the pseudo-labella were

* See especially a most instructive instance of similar development in a flower of *Ophrys aranifera* described by Dr. Masters, Journ. Lin. Soc. Bot. viii., 207.

† "Fertilization of Orchids," p. 292.

‡ Journ. Lin. Soc. Bot. viii., 132.

precisely the same both in size, colour, and number of crests or folds as an ordinary labellum, and the columns were exactly the same as in ordinary flowers.

SHORT NOTES AND QUERIES.

RUMEX ELONGATUS, Gussone, IN ENGLAND.—On July 7th, when examining the vegetation, with especial reference to Docks, of the Thames shore, on the Surrey side, between Putney and Hammersmith Bridges, I gathered two examples of a *Rumex* which was new to me. I have not been able to match them with any specimens in the large series of British and European Docks in the British Museum; but judging from the figure and description of Gussone in his “*Plantæ rariores*,” they seem referable to *Rumex elongatus* of Calabria and Sicily. The Thames plant has many of the characters of *R. crispus*, but differs altogether in its root-leaves, which are smaller (8 to 12 inches long, by 1 inch broad), perfectly flat without a trace of crimping, entire, linear-lanceolate, and much attenuated at the base into the long petiole. The inner perianth-leaves, too, are more elongated than in *R. crispus*, and the plant differs conspicuously in its tall, lax habit and more distant whorls. It will be well worth while for botanists to keep a look-out for a plant having these characters—probably enough elsewhere passed by for *R. crispus*—so that it may be more completely examined (the fruit especially requires it), and its claims to recognition as British—at present scarcely sufficient—established beyond a doubt. On the same day *Rumex sylvestris*, Wallr., was found abundantly in the locality where it was first found by Mr. Warren near Putney, occurring with *R. Friesii* and *R. conglomeratus*, *Ceanothe crocata*, *Nasturtium palustre*, and other Thames-side species.—HENRY TRIMEN.

A SECOND STATION FOR CAREX MONTANA, Lin., IN DEVON.—It may be remembered that when I reported this *Carex* as a Devonian species in the June number of the “*Journal*,” through my having discovered it in May last on Bickleigh Down, I spoke of having the expectation of being shortly able to record it from elsewhere near Plymouth. This has been realised, for I have since found it on Roborough Down, a very extensive common, which, commencing about a mile north of Bickleigh Down, extends thence for over four miles in a northerly direction. Here it occurs in numerous spots, on both sides of the Plymouth and Tavistock turnpike-road, from near the old camp, about $6\frac{1}{2}$ miles from Plymouth, on to a little beyond the 7-mile stone. It is, I believe, without exception, the earliest of our Carices to flower, for by the third week in June I found the seeds all shed and the spikes withered; but the large patches formed by its tufts of light-green leaves and its thick shaggy rhizome served then to distinguish it from *pilulifera* and *præcox*, here, as on Bickleigh Down, its associates. It ascends to the highest part of the common, about 650 feet above sea-level. The soil is very similar to that of Bickleigh,

being Devonian slate traversed by elvan veins, which latter furnish a stone that is much quarried, and is locally well-known as "Roborough-stone." Since I wrote my first notice of this *Carex* I have found that it occurs more plentifully at Bickleigh than I then supposed, being scattered over a considerable part of the common, and not confined to the three spots where first discovered.—T. R. ARCHER BRIGGS.

CINERARIA CAMPESTRIS IN LINCOLNSHIRE.—I send a specimen of this species from Ancaster, in this county, gathered on June 7th. This locality extends its north-eastern range, Cambridgeshire being the highest point recorded on this side of England. I see it is not given in Mr. Britten's list of Lincolnshire plants, compiled last year.—G. S. STREATFEILD.—[Additional to Province 8, Trent, of "Cybele Britannica."—*Ed. Journ. Bot.*]

CLAYTONIA ALSINOIDES.—This species is growing in tolerable abundance in a small plantation at Ince, Cheshire. The wood is about one hundred yards from the river Mersey. A stranger to British botany, going suddenly into the wood, and observing it growing side by side with our common *Stellaria media*, would find it difficult to persuade himself that it was not really a native of the British Islands. It is one of those plants which mature their seeds under almost any circumstances, and therefore will rapidly increase despite of the soil, situation, or state of the atmosphere. Its near ally, *C. virginica*, sometimes spreads rapidly in the garden. Like another alien, *Mimulus luteus*, it must shortly be admitted into our Floras as an introduced species.—J. F. ROBINSON.

LEPIDIDIUM DRABA, L., AS A WEED.—A short time ago a plant of *Lepidium Draba* was sent to me by a former pupil of the Royal Agricultural College, Cirencester, Mr. Harry Willett. He says:—"It grows near Newhaven, in some good land, supposed to have been introduced as seed in foreign wheat. It is a very troublesome weed, very difficult to eradicate." Along with Mr. Willett's letter was another, as follows:—"The large tap-root, broken off 2 feet 9 inches from the surface. The other a specimen of the plant, now just in bloom, gathered from the surface. The plant first noticed some thirty years ago, and supposed to be brought on the land from seeds in the manure from some foreign wheat. The owner is a miller, dealing constantly in all kinds of foreign wheat. It has been kept under by pulling, but breaks off from 6 to 9 inches below the surface, so that a species of crown is formed about the depth of ordinary ploughing, and throws up from it, as illustrated in the large root enclosed. Soil, a very still alluvial deposit, and on digging down 3 feet a few traces of small fibrous roots were found, but not to any extent; and in one part where a railroad has been constructed, the plant has forced its way up through chalk and ballast, and grows as strong as anywhere. The owner would like to know the botanical name and character of the plant, and also (if possible) how to eradicate it, as otherwise it is very valuable corn-growing land." The long tap-root (about 15 inches) answers well to the description.—W. R. McNAB.

Extracts and Abstracts.

ON TRAPA NATANS, L., ESPECIALLY THE FORM NOW LIVING IN THE SOUTHERNMOST PART OF SWEDEN.

By F. W. C. ARESCHOUG.

(TAB. 134.)

BOTH in respect to its morphology, its history, and its geographical distribution, *Trapa natans*, L., is deserving of special attention. The morphologist has studied in particular the singular capillary organs growing from the submerged parts of the stems, which organs have been considered by some as leaves, corresponding to the well-known submerged leaves of many *Batrachiums*, by others as adventitious roots. All doubts, however, as to their being truly roots appear now to have been removed by the very exact inquiries of Reinke ("Untersuchungen über Wachstums-geschichte und Morphologie der Phanerogamen-Wurzel," in Hanstein's Bot. Abhandlungen). The intercellular system, so greatly developed in aquatic plants for the purpose of keeping their tender and weak stems upright in the water or floating on its surface, seems not to be sufficient for the purpose in this plant. Its large and ponderous fruits, which appear to have need of resting on the surface of the water in order to become ripe, would very soon drag the whole plant down to the bottom, if the petioles and peduncles were not distended into swellings which act as a sort of buoy. The swelling at these parts does not begin till the flowering season, and increases in proportion as the fruit grows; so that these organs attain their full size when the fruit is completely grown. The larger the fruit the larger are they also; on the forms with small and light fruits they are nearly imperceptible. Consequently, this plant adds a new example to the many which organic nature exhibits of the physiological dependence of parts of an organism which seem to have very little connection with one another. The fruit is described as a nut in almost all the works to which I have had access, but authors have overlooked the fact that the brown coriaceous endocarp is not the outermost covering of the fruit. On the ripe fruit this is more succulent and opaque, and is readily stripped off, when the fruit has for some time been in the water, and so the hard and woody endocarp at last forms the outermost covering. This circumstance has been already noted in the "Botanical Register," iii., 259, though not noticed by later authors; the fruit should rather be called a drupe than a nut. Further, it deserves mention that the spines of the fruit are armed with strong deflexed barbs at the edge of their points (fig. 7c.). By these barbs the empty fruit is able more completely to fulfil its use as an anchor for keeping the plant itself in the mud, after the seed has germinated. For the same reason the fruit adheres to the end of the young plant. These barbs are also found on the fruit-

spines of some other species (viz., *T. quadrispinosa*, Roxb., and *T. bispinosa*, Roxb.).

In regard also to its geographical distribution, *Trapa natans* shows some remarkable peculiarities. At the present time it seems to have its chief distribution in Europe, in the south but not in the southernmost part of the continent. It is found in France, the north of Spain and Italy, Austria, Hungary, Transylvania, Croatia, Dalmatia, Turkey, the north of Greece, and the whole south and south-east of Russia. In middle Europe it is less frequent; it grows, however, in a few localities in the north of Germany. Two years ago it was found in Lake Immeln in Scania, the southernmost part of Sweden. In the Caucasian provinces it is frequent, and it has also been found in some places in Siberia as far as Amur (according to specimens in the Herbarium of the Royal Swedish Academy of Sciences, collected by Maximowicz). Walpers also states that it is represented in "Icon. pl. in China nasc," tab. 21, as growing in that country. It is not easy, however, to decide whether it is originally wild everywhere, or whether it has been cultivated, or in other ways protected by man. In the "Manuel de la Flore de Belgique," by Crépin, p. 105 (ed. 2), it is said to be sometimes cultivated in ponds in Belgium, but I have seen no reports of this kind from other countries. However this may be, it seems to me to be very probable that *Trapa natans*, L., has primitively had its origin in the Caucasian provinces, a supposition which seems to me the more probable, as all the other species of this genus have their domicile in Asia, principally, however, in the south and east part of it. But what seems to be of the greatest interest in respect to the geographical distribution of this plant is the fact that by degrees, almost within our sight, it has disappeared from tracts where it seems formerly to have been frequent. Thus, for instance, it is nearly exterminated in Switzerland, where, according to Heer ("Die Pflanzen der Phalbauten"), it grows only in one locality, a small pond at St. Urban in Luzern, and M. Crépin (*l.c.*) tells us it grew in many localities in Belgium, where it would be now vain to look for it. In Holland it was still growing last century, but has now vanished, and this is also the case in Sweden, where it was found at the same period in some localities in two of the southern provinces, viz., Vestrogothia and Smoland. That the disappearance of this plant has not commenced at a recent period is manifest from this fact, that the fruit of it in a half-fossil state has been found in the turf in localities where the plant, as far back as we know, has not been living—for instance, at Gallemosse in Lolland, a Danish island, according to Rostrup (Vidensk. Meddelelser fra den Naturhistoriske Forening, 1858, pp. 121—26), and in turf at Näsbyholm in Scania, according to A. G. Nathorst (Kongl. Vetenskaps Academiens Forhandlingar, 1872, p. 133).

It is a matter of some difficulty to trace out the causes of the extermination of this plant; probably they are various, and not the same in all countries. No doubt the supposition that a change of climate has been most efficacious at once suggests itself. But on the other hand the plant has more or less completely disappeared, not only from the north of Europe, where a diminution in mean temperature might have produced the greatest influence on its occurrence, but also

in some other countries, where the climatic conditions are probably nearly analogous with those prevailing in the countries where it is still living. If lowering of the temperature were the only reason, it would be impossible to explain why the plant has disappeared from Switzerland or Belgium, but remained in the north of Scania, where the mean temperature is lower than in Belgium or in the low parts of Helvetia. Perhaps its eradication can be explained by the circumstance that the population in some countries have used the fruit for food; the plant, being annual, might thus very easily have been destroyed, as has really happened to many other plants, when they have been of any use to man. It is also not impossible that the extinction of our plant is connected with the drying up of the lakes and ponds where it once had its home, and this is assigned by Crépin (*l.c.*) to be in some measure the case with its localities in Belgium. Perhaps its destruction may also have been forwarded by fishing with the drag. But though it is very probable that the plant has by such means been exterminated in many localities, its almost complete disappearance from the north of Europe cannot be so explained. For in this region the causes just mentioned, except the sinking of the mean temperature, must have exercised much less influence than in the middle of Europe; whilst some of them do not exist. In Sweden, as well as in Denmark, there are plenty of lakes, and no want of fitting localities can have arisen. Nor is it known that the fruit of this plant, at least during the historical period, has been used for food by the population in these countries. Its employment in this respect is at least unknown to the people in the part of Scania where this plant continues to grow. Neither is it probable that fishing with the drag has been practised more frequently in Sweden and Denmark than in the middle of Europe, where in consequence of the more numerous population it would be likely that more assiduous search would be made for substances fit for food.

It is, however, an uncontested fact that *Trapa natans* has more completely disappeared from the north of Europe than from the middle and south, and I think that a change of the external conditions of its life has acted in the former case, but in the latter the above-named circumstances, connected perhaps also with a change of climate. Steenstrup ("Smaa udflygter paa Natur- og Kultur historiens Fællede, I., Kartoffel"), it is true, presumes that *Trapa natans* has been cultivated by an earlier population, and thus extended its primitive limits, within which it retired when the cultivation of it ceased and it was deprived of protection from man. It may, however, be objected to this, that in such a case the plant ought first to be destroyed in countries where the external conditions have been more disadvantageous, as is the case in the north of Europe. But we find that it has during the same period become extinct in countries in the middle of Europe, where the physical conditions can scarcely be more unfavourable to it than in the north of Germany, where it still grows without being cultivated. If, therefore, the supposition of Steenstrup's be well founded, we are forced to suppose other causes of extinction also for the middle of Europe. Regarding this plant only, then, it is impossible to find out the real cause of its disappearance. But bearing in mind that some other plants and animals of a

more southern origin, *e.g.*, *Emys lutaria*, Bon., *Sus Scrofa*, L., have entirely disappeared from the north of Europe, or at least are to be considered only as residues of an earlier Flora and Fauna, which must depend on climatic alterations, it must be considered probable that the extermination of *Trapa natans* in these countries has been caused by a change of climate. An indirect proof of this view I find in the circumstance that *Trapa natans* has *gradually* disappeared. If the cessation of its cultivation were the true reason of its extinction, it would probably vanish quickly, almost as soon as its cultivation was stopped. The variety of this plant, which now grows in Scania in one locality, also seems to point to an existence becoming feeble and weakened by unfavourable physical conditions.

The influence which a change of physical conditions acting during a long time has had on the composition of the existing vegetation of a country does not appear yet to have been fully recognised by botanists; nor do they seem to have realised that to exercise its influence such change need not be so great as to immediately cause the death of a less or greater number of species. Experience teaches us that the plant itself is a very sensitive indicator of changes of climate; so much so that many slight modifications, even when so imperceptible as to nearly escape attention, have an influence upon vegetative life and its various operations. Consequently every change of climate must be advantageous to some species and pernicious to others, and will so disturb the equilibrium which before existed in the statistical proportions between the species as to cause those species which have been favoured by the change to more or less completely expel the species on which the change has exercised an unfavourable influence (comp. F. Areschoug, "Om den Europeiska vegetationens ursprung," in *Forhandlingar ved de Skand. Naturforskannes*, 10de Möde, 1868). In any large area there will be found a greater or less number of species which have their northern or southern limits there, and consequently you find only at a few localities all the physical conditions for their growth combined. Such plants must more than others be very susceptible to climatic changes, and a slight diminution of the mean temperature will have a favourable influence on the spread of those which have their southern limit in the district, but a pernicious one on the plants of a southern origin growing there. *Trapa natans*, L., in the Scandinavian peninsula is such a plant. As already mentioned, it seems to have its original home in the Caucasian provinces, and its northern limit in Sweden; nor does the fact that it still exists in Lake Immeln in the north-east of Scania go against the view of its extermination in other localities of the Scandinavian peninsula by the influence of physical conditions. This seeming contradiction can be solved in two different ways—either the plant has not in Immeln had to struggle for its existence against so dangerous rivals as in other localities whence it has disappeared, or some circumstances especially favourable to the plant have in that locality been able to, in some way, neutralise the unfavourable physical conditions.

The *Trapa natans* which grew in Sweden in the last century was not quite identical with the form now living in the middle and south of Europe, and was described by Wahlenberg (*Fl. Suecica*, i., p. 100)

as a variety, and named *glaberrima*. According to this author it differed from the typical form by greater tenderness, by the nearly glabrous leaves, petioles, and sepals, by the very small swellings of the petioles and peduncles, and by the nearly sessile fruit. Moreover, to judge from the specimens in the Herbarium of the University of Upsala and the Royal Academy of Sciences of Stockholm, the flowers also appear to be smaller, and the leaves for the most part to have a form differing from the typical one, in being more gradually narrowed to their base, and in which their greatest breadth coincides with the middle of the leaf. It must not, however, be omitted, that in the Herbarium of Upsala there is a specimen labelled "e Smolandiaë aquis, Thunberg," which as to size, hairiness, the form of the leaves, and the swellings at the petioles, quite agrees with the typical form. But I believe I can assert decidedly that this specimen is not from Sweden. It has a more southern character even than specimens from the north of Germany, and resembles very much the form of *Trapa natans* which grows in the west of France.

The characters of Wahlenberg's variety seem very inconstant, and this is also the case with the form of the leaves. There is, to be sure, a very great difference between this form and that from the south of Europe, the latter being characterised by shorter, larger, and more swollen petioles, much greater size, and more dense hairiness, larger flowers, and by the form of the lamina, which has a nearly truncate base, and is almost semicircular, its greatest breadth being nearer to the base. But towards the north and east this form graduates into the above-mentioned variety, without, however, even in the north of Germany becoming quite identical with it. The lamina, even if it is more prolonged, has its greatest breadth near the base, this being almost truncate. Forms graduating into the variety *glaberrima*, Wg., I have seen from the country about the Amur, the Ukraine, Silesia, and East Prussia. With respect to the length of the peduncles there seems to be very little difference between the Swedish and Continental forms.

The form of *Trapa natans*, L., which was found in Lake Immeln, Scania, in the summer of 1871, agrees very well with Wahlenberg's variety. It has the form of leaf characteristic of this variety even much more pronounced, notwithstanding that some leaf or other on the more vigorous specimens may agree with those of the North German form. With respect to its glabrosity it is more inconstant than the variety *glaberrima*. The leaves are very seldom quite glabrous, the petioles often being slightly hairy, which may also be the case with the whole leaf. Sometimes its hairiness is as dense even as on the South European form. But in other respects, as, for instance, tenderness, length of the petioles and their small swellings, smoothness of the sepals, and small flowers, the form from Scania agrees with the variety *glaberrima*.

The point, however, which distinguishes the Scanian form from that growing on the European continent, and which possesses a special interest, is the insertion of the floral whorls. Not only *Trapa natans*, but all the other species of this genus (e.g., *T. bicornis*, L., *T. bispinosa*, Roxb., and *T. quadrispinosa*, Roxb.), have the fruit situated below the sepals, so that only a very little part of it is entirely free. A

fossil species found in the miocene strata of the peninsula of Alaska and named by Heer ("Flora fossilis Alaskana," in Vet. Akademiens Handlingar, 1869, p. 38, tab. viii., figs. 3—14), *T. borealis*, has the greater part of the fruit placed below the sepals. But the fruit of the form from Scania is in great part free, the portion situated above the upper pair of spines being as long as that below them, or even longer (figs. 7—9), and the part of the fruit superior to the lower pair of spines twice as long as that below them. Already on the young ovary this peculiarity is very apparent, the greater part of it being free (fig. 10). The free part of the ripe fruit is much furrowed and nearly conical, but much compressed at the two sides, on which the lower spines are inserted (fig. 7*b*). Thus the fruit has an oval form (fig. 7*a*), when the spines are not paid attention to. Moreover, the spines are much longer and thinner than those of the typical form, and the fruit itself is more opaque, with a thinner pericarp. Even on very small, and therefore seemingly undeveloped fruits (fig. 9), there extends from their top a long filamentous organ, which at the first glance might be taken for the style. This organ, however, is the persistent petiole of the larger cotyledon, which at the period of germination remains within the fruit (comp. Barnéoud "Mémoire sur l'Anatomie et l'Organogénie du *Trapa natans*, L.," in Ann. des Sc. Nat., 3ème ser., 9, p. 223, pl. 12, figs. 1—6), though the length of it exceeds by far that figured by this author, and it is to be seen on fruits so very small that they seem to be only half-grown.

It is a pity that ripe fruits are so very rare in botanical collections, so that I have seen them only from a few localities, viz., Breslau, Leipsic (the Bot. Garden), Altenburg, and Munich (the Bot. Garden), in Germany; Versailles, Angers, and Rouen (Bot. Gard.), in France; and from the Ukraine. But generally the fruits from all these localities agree very well with one another, and also with the figures I have seen, and therefore I believe it to be probable that their form is that typical for the *T. natans* of the Continent. Their size, their thick pericarp, and short and strong spines seem to indicate a much more vigorous life; their colour is a more shining dark brown. Seen from one of the sides on which the lower spines are inserted, the fruit has almost the form of a triangle, one angle of which is directed downwards (fig. 1*a*). The two upper spines are inserted nearly at the same level as the superior part of the fruit, and this part is so short that it is seven or eight times shorter than the inferior part, and its section has a rectangular form (fig. 1*b*). The lower spines are inserted sometimes at the same level as the others, sometimes lower down—at least one of them; so that half or more of the fruit becomes inferior. The ovary also is very different from that of our form, the greater part being inferior (fig. 2).

Notwithstanding all my endeavours, I have not been able to procure any fruit belonging with certainty to var. *glaberrima*. From the Botanical Museum of Upsala, indeed, I have seen some fruits which perhaps have their origin from this variety. Their exterior seems to bear indications of their having laid in the mud for a long time, the succulent outermost covering is to some extent still remaining, and the hard endocarp is very much corroded and uneven. In shape they are intermediate between the fruit of the form from

Scania and that of the Continental form, the two upper spines not being on a level with the superior part of the fruit (figs. 4, 5). With respect to the thin pericarp and the narrow acute spines they agree with the fruits of the Scanian form. But this has a much larger part of the fruit placed above the spines, and on the other hand, to judge from a specimen in the Herbarium of the Royal Academy of Stockholm, collected last century in the north of Smoland by Liljeblad, the young fruits of the variety *glaberrima* are nearly free (fig. 6), and agree in this respect with those of the Scanian form. Therefore if the above-mentioned fruits belong to the variety *glaberrima*, it is probable that they have lain a very long time in the mud, and are of an earlier period, when the form which characterised the fruit of this variety was not as yet quite attained. For, as has already been remarked, the young fruit of the variety *glaberrima*, such as they were last century, appear to make it probable that this variety also, with respect to the full-grown fruit, was identical with the form of *T. natans* still growing in Scania.

But the form now living here is not, so far as its fruit goes, the same as that the fruit of which has been found by Mr. Nathorst in a half-fossil state in a turf at Näsbyholm in Scania. This fruit (fig. 3) in every respect agrees with the fruit of the Continental form, and this is also the case with the fruit of the half-fossil form from Denmark, according to specimens which Prof. Steenstrup has been so kind as to lend me, and as shown in the figure given by Rostrup (*l.c.*). And finally the half-fossil fruits of the same plant, found in the Swiss pile-buildings, according to the figures by Heer (*l.c.*) quite agree with the half-fossil fruits from Scania and Denmark.

It results from these inquiries that the form of *Trapa natans*, L., which is now living in Scania nearly agrees, as to its leaves and flowers, with the form which grew in the last century in Smoland, though the peculiarities by which it is distinguished from the typical form which is found on the Continent are unessential, and somewhat changeable. With respect to its fruit the Scanian form probably agrees with that from Smoland, but is very distinct from the Continental form, which on the contrary in this respect agrees with the half-fossil form from the turfs of Scania and Denmark, and from the pile-buildings in Switzerland. The supposition, therefore, seems very reasonable that the plant now living in Scania is, as it were, a degenerated form of that which formerly grew in the same province. And the same seems to have been the case with the *Trapa* in Smoland during last century, even if, at an earlier period, it approached nearer to the typical form, as seems to be the case if the above-mentioned fruits in the Botanical Museum of Upsala are from Smoland. It is evident that the fruit and also the pistil of the Scanian form show that the plant was the product of a plant labouring under the influence of unfavourable physical conditions. Experience teaches us that it is the organs of reproduction that in the first place suffer by change in the external conditions of life. Accordingly we find that the organs of vegetation of this form are nearly unchanged, but that its pistil and still more its fruit are greatly modified. The former of these organs is not very well defined, often oblique, or nearly deformed (comp. the figs. 7a, 8, 9). It almost seems as if the plant wanted sufficient vital power to cause

the excavation in the receptacle, by which the fruit of the typical form becomes so nearly inferior. Its fruit has also a thinner endocarp, and is smaller than that of the Continental form. Even on fruits which are much less than the smallest of those figured (fig. 9), there is found a filamentous prolongation from the top, which shows that they have germinated in spite of their small size. The most ancient species of this genus known, *T. borealis*, Heer. has also a fruit for the greater part superior, and consequently one is tempted to suppose that, as the physical conditions at the period when the type of *Trapa* first appeared on the earth could not produce the form of the fruit characteristic of the genus in its complete development, so this typical fruit will return under the influence of unfavourable external conditions to the form which characterised the first representation of the *Trapa* type.

It is, however, to be hoped that positive proofs of the truth or untruth of this supposition will be afforded. Probably there are turfs in the vicinity of Lake Immeln where half-fossil fruits of *T. natans* may still be found. If such fruits belong to the typical form, it may certainly be assumed that the species now living there has degenerated in the manner above mentioned.

As the name *glaberrima*, given by Wahlenberg, does not denote any character essential to the form, and moreover involves an error, the plant being by no means quite glabrous, and as also it is not yet fully decided that the Scanian form is identical with that variety, I have given this form another name, and characterise it in the following manner:—

Trapa natans, L., var. *conocarpa*, fructu e lateribus duobus ambitu ovali, maximam partem supero, parte supera conica compressa.

Hab.—In lacu Immeln, Scaniae borealis, olim etiam in lacubus Smolandiae borealis (?) & Vestrogothiae (?).

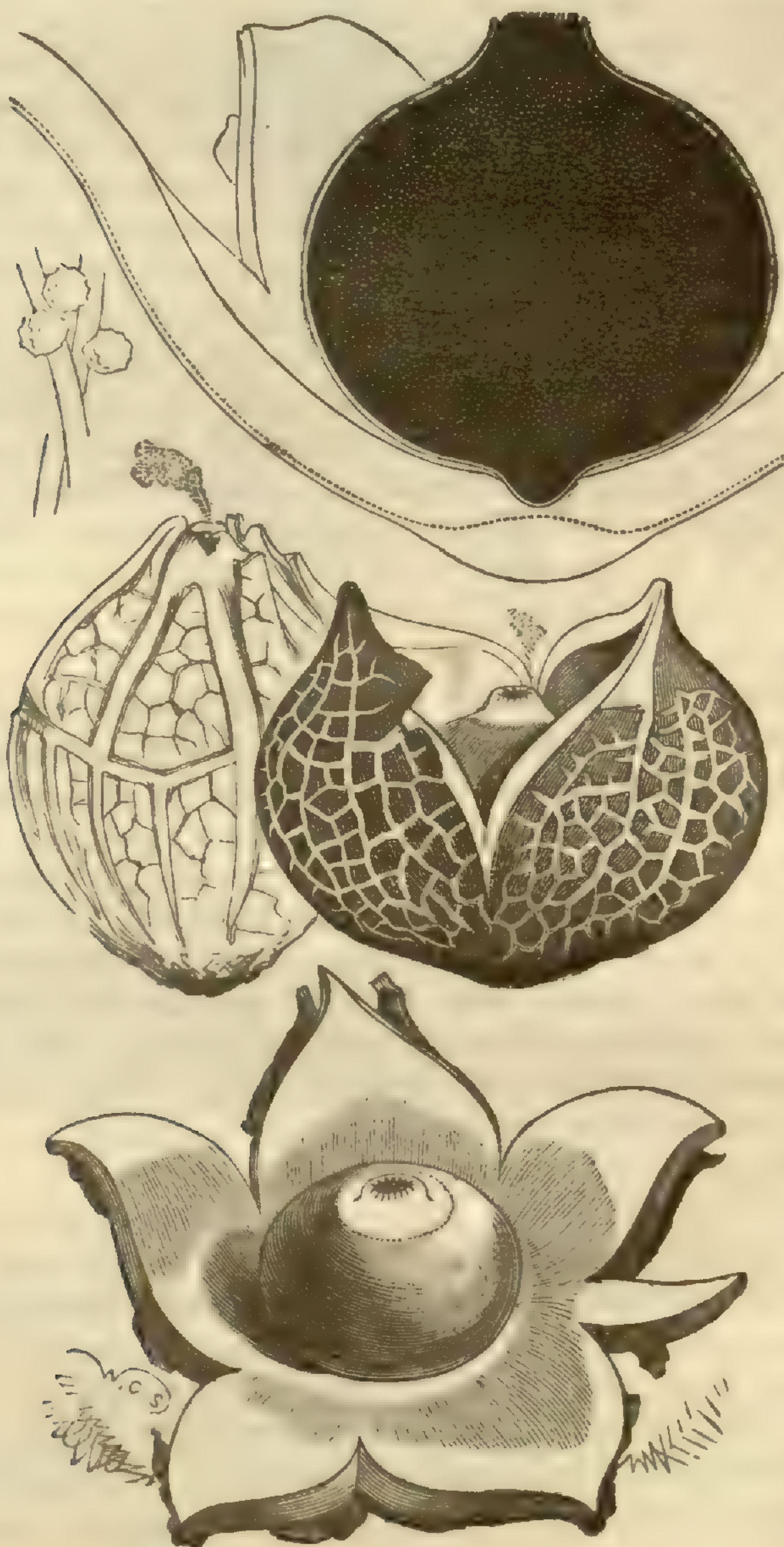
DESCRIPTION OF TAB. 134.—Fig. 1. *Trapa natans*, L., from the Bot. Garden at Leipsic: *a*, the fruit (nat. size); *b*, section of the free part of it. Fig. 2. The ovary (nat. size) of a specimen from Altenburg. Fig. 3. A half-fossil fruit (nat. size) of *T. natans* from a turf at Näsbyholm, in Scania. Figs. 4, 5. Fruits (nat. size) supposed to belong to the variety *glaberrima*, Wg., from an earlier period. Fig. 6. Young fruit (nat. size) of *T. natans*, var. *glaberrima*. Fig. 7. *T. natans*, var. *conocarpa*, from Scania: *a*, a ripe fruit (nat. size); *b*, section of the free part; *c*, the point of a spine. Figs. 8, 9. Fruits (nat. size) of *T. natans*, var. *conocarpa*, from Scania. Fig. 10. Ovary of the same (nat. size).

[Translated and revised by the author from the "Review of the Transactions of the Royal Swedish Academy of Sciences" for 1873.]

SPECIES OF GEASTER NEW TO BRITAIN.

MR. W. G. SMITH has contributed an illustrated monograph of the species of Geaster found in Great Britain to the pages of the "Gardeners' Chronicle." Eleven are described, and we extract the descriptions of two not before published as British plants. By the kindness of the Editor of the "Gardeners' Chronicle" we are able also to give the illustrative figures.

"GEASTER MICHELIANUS, *nov. sp.*—This is undoubtedly the finest



GEASTER MICHELIANUS.

Half actual size ; section of inner peridium real size ; spores $\times 700$ diam.

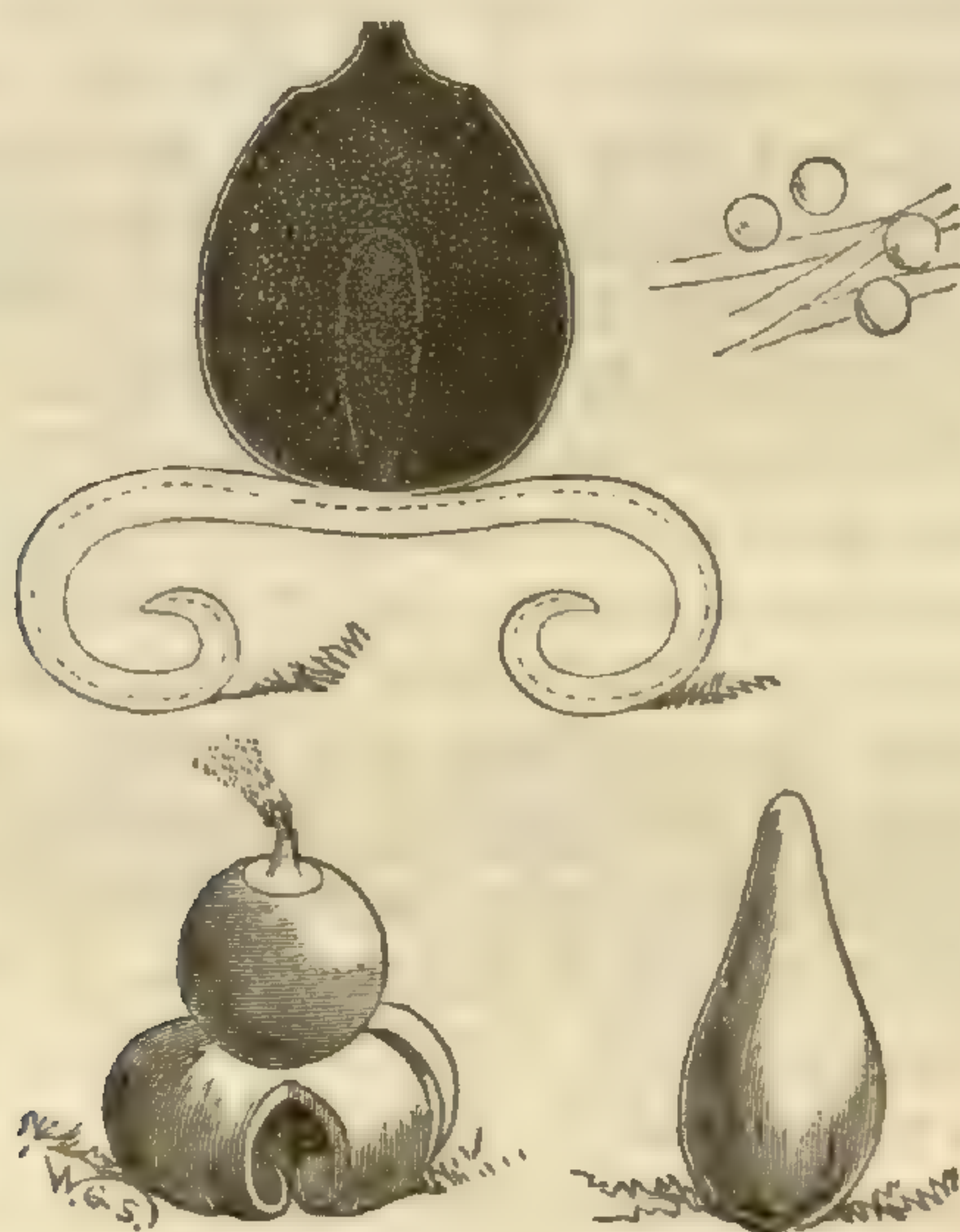
Geaster in our flora, and at present has only been found in one locality, viz., amongst Rhododendrons at Castle Ashby, by Mr. Beech, the Marquis of Northampton's gardener; it has several times been sent to the meetings of the Royal Horticultural Society, and has been referred to under the name of *G. tunicatus*, Vitt., by Berkeley, in the 'Annals of Natural History' (No. 1306), and under that of *G. lagenæformis*, Vitt., by Cooke in his 'Handbook.' The latter plant is now known to be British, and is quite different from *G. Michelianus*, a cut of which (taken from a hasty sketch by Mr. Fitch) accompanies the description of *G. lagenæformis*, Vitt., in Cooke's 'Handbook.' We are indebted to the constant kindness of Mr. Berkeley for being at last able to identify the Castle Ashby Geaster as the first plant of Micheli, and to publish it under a correct name, viz., *G. Michelianus*. Dried specimens have been issued with the "Erbario Crittogamico Italiano" (343 and 979), gathered in 1862 and 1869, and published under the name of *Geaster tunicatus Michelianus*, and from a careful examination of these plants and their fruit we can find no characters of moment to separate them from ours. Our plant is undoubtedly the Geaster figured by Micheli in the "Nova Plantarum Genera," t. 100, f. 1, under the name of *Geaster major umbilico fimbriato* (though Fries erroneously refers this plant to *G. fimbriatus*), and is the same with the *G. tunicatus Michelianus* of 'Erb. Critt. Ital.' There is, however, such an endless confusion of names, synonyms, poor figures, and imperfect descriptions of this and one or two allied plants, that we publish *Geaster Michelianus* as a new species, and consider our British plant as the same with Micheli's figure (t. 100, f. 1), the same with the dried specimens in the 'Erb. Critt. Ital.,' 343 and 979, and distinct both from *G. lagenæformis*, Vitt., and *G. tunicatus*, Vitt.

"The following description is prepared from fresh British specimens:—Outer peridium pale buff, thick, fleshy, generally splitting into five or six sub-equal laciniae, clothed on the outside with a thin dark brown bark, which again splits into elegant honeycombed patterns; inner peridium pale slatey buff, spherical; mouth prominent, obtuse, dentate, paler in colour than the body of the inner peridium; spores slightly tuberculoso-echinulate, .00014" diameter (in which measurement the English and Italian specimens exactly agree). When mature, and when the outer peridium bursts, this plant throws itself sometimes 9 inches away from its place of growth. The way in which the base of the inner peridium is seated on the centre of the stellate outer peridium is very extraordinary.

"GEASTER LAGENÆFORMIS, Vitt.—We are indebted to Mr. Edward Parfitt, of the Devon and Exeter Institution, for the materials wherewith to figure and describe this elegant and distinct species. Hitherto it has not been published as British, though we believe we recently had the same plant sent us from Norfolk through Mr. Charles B. Plowright. Mr. Parfitt's specimens were found in Stoke Wood, near Exeter, in November, 1868; one or two were afterwards seen in the same locality in 1869; but since that time they appear to have vanished from the spot.

"The following is Vittadini's description:—'Outer peridium splitting to the middle, in nearly equal acuminate laciniae, inner stratum very thick, evanescent. Inner peridium sessile, flaccid;

mouth determinate, plano-conic, ciliato-fimbriate, columella rather long, clavate.' Mr. Parfitt adds to this:—'Outer peridium white, with furfuraceous brown scales towards the base, at length expanding into six rigidly recurved laciniae; these sometimes again dividing so as to make six or eight more lesser segments; inner stratum very thick and brittle, cracking on the least pressure being applied. When the laciniae first expand, the inner stratum is a beautiful rosy-white colour. Inner peridium about two shades darker in tint than the inner stratum, and appearing under a lens to be finely felted together;



GEASTER LAGENÆFORMIS.

Half actual size; section real size; spores $\times 700$ diam.

round the mouth a depressed ring, in which the felted appearance is more strongly developed, directed upwards and forming the mouth, which is conic, nearly smooth, and very finely fimbriated.' The Exeter plants exactly accord with Vittadini's published figure.

"In infancy the plant strongly resembles an antique jar with narrow mouth, hence the specific name. The spores are perfectly round and smooth, thus differing from the majority of Geasters, and measure $\cdot 00012''$ diameter.

"Mr. Parfitt has kindly furnished sufficient dried materials for recognition to the Royal Herbarium at Kew and the herbarium at the British Museum.

"The Kew herbarium now possesses nine of the eleven British species, being deficient of *G. coliformis*, P., and *G. mammosus*, Chev. The British Museum has one more plant than Kew in a capital specimen of *G. coliformis*, P. (the Bloomsbury *G. mammosus* not being Sowerby's plant). Out of the nine British species at Kew, and the ten at the British Museum, six each have been indirectly furnished through correspondents of the 'Gardeners' Chronicle.'"

Proceedings of Societies.

BOTANICAL SOCIETY OF EDINBURGH.—*May 8th.*—"Notes on the Fertilisation of the Cereals." By A. S. Wilson. The cereals to which the observations refer embrace about fifteen varieties of Wheat, two varieties of Rye, five varieties of Barley, and about twenty varieties of Oats. In all of these, except one variety of Barley, the flowers open during the act of fertilisation. This variety is the two-rowed Barley, called Italian or Golden Barley. It is allied to the Sprat or Battledore, the Fluckwheat, and some others, the peculiarity of which is, a short ear with the grains closely packed together, at half the distance apart of the common two-rowed and Chevalier Barleys. Probably in none of these close-flowered, two-rowed Barleys do the flowers ever open. The cereal flowers are open for only about twenty minutes or half an hour. Even in the calmest days, the whole of the pollen is discharged in one or two minutes. It is generally during the act of opening that fertilisation seems to take place. It is very true, as Dr. Syme says, that when the anthers of Wheat are extended they are empty; but they do not empty themselves within the closed pales, but in falling from one side to another of the flower-cup as it opens; for if an anther is seized the moment it begins to appear on the opening of the flower, it is found to contain all its pollen. But why do the flowers open at all? What force causes them to open? The cereal flowers are not like some others, which open many times and at stated hours of the day; they open only once, and at all hours, shady as well as sunny. The principal facts are best seen in Rye. If a Rye flower is opened a moment before the natural time of flowering, the filaments of the anthers will be found to measure about one-sixteenth of an inch in length. In the course of five minutes, or less, from the instant the pales begin to open, the filaments will, in many cases, have grown or extended to twelve-sixteenths, while the whole of the pollen will have fallen out. In the Oat the filaments, originally one-twentieth of an inch, extend to about one-third of an inch in length. This rapid extension of the filaments is not a mere straightening out of a doubled-up thread, but an actual growth or erection, which remains unretracted. And in the Wheats, which have light anthers, the filaments are frequently so rigid as to support the anthers for a time in a vertical position without any support, turning them spontaneously into new positions. In a very short time the flower begins again to close, but much more slowly than it opened. In the natural position the spikelet of Darnel lies closely against a hollow in the rachis; but the opening of the lowermost inner flower will for a time push the whole spikelet out of its natural place; and in the Fly Oat (*Avena sterilis*) and Canadian Oat (*Avena sativa*), which have very stiff pales, the force which separates them would be quite measurable. What, then, is the initiative act in opening the flower? Does the maturity of the pollen stimulate the sudden extension of the filaments? If in a field of flowering Rye an ear which has not yet blossomed be gently drawn through the hand, in a minute perhaps

three or four of its flowers will begin to open, and the anthers to show themselves. The stroke of the morning sun, an abrupt eddy of wind, the collision of one ear against another, is enough to bring the force into play by which the ripe flower is opened, and the filaments extended. So long as the anthers are kept by the half-opened pales in a more or less vertical position in upright ears no pollen is discharged. The discharge seems to follow from purely mechanical causes. There does not seem to be any inherent projectile force in the anther. If an ear of Rye ready to blossom is placed under a glass shade, and the flowering watched, it will be seen that no dehiscence takes place until the anther is at least in a horizontal position, or falls into that or a lower inclination with a jerk. The rapid extension of the filament throws the discharging pores of the anther into various positions, until at last the anther is pushed out of the flower-cup altogether, and hangs with the opening lowermost. But even in this position the adhesion of the pollen-grains to the inner sides of the lobes, prevents complete discharge where there is no mechanical disturbance. It is probable that fertilisation usually results from the few pollen-grains which fall out on the inside of the pales as the anthers are being tumbled out of the flower-cup. These, however, may not come into contact with the stigma until after the flower has again closed. This result is more probable in Wheat, Barley, and Oats, than in Rye. The anthers of Rye are very much larger than those of the other cereals, and contain a far larger number of pollen-grains — about 40,000 each. But notwithstanding this large provision, there are always in Rye far more barren ovaries than in Wheat, Barley, and Oats; which seems to result from the fact that the filaments of Rye extend to a much greater length than those of the three other grasses, and so carry the pollen further beyond the reach of the feathers of the stigma. Besides, the discharging pores of the anthers in Rye are generally outside before any discharge takes place, so that fertilisation must be either cross, or due to little eddies of air carrying back a few grains to the enclosed stigma. In most cases the anthers, of Rye especially, are speedily pushed into what appears the worst possible position for ensuring self-fecundation, as if there was a danger of over-fecundation to be avoided. And yet this conjecture is scarcely warranted in view of the Italian Barley, the pollen of which is discharged inside the unopened pales—whether wholly or but partly is yet questionable. The assertion made lately, that the majority of the flowers in Barley never open, is certainly not consistent with the phenomena as exhibited in Scotland. The Italian variety alone fertilises in an unopened flower. Now the cause of this does not seem to be the closeness and pressure of one floret upon another, because in the six-rowed Barley, *Hordeum hexastichon*, the florets, while equally close, open in the same way as in the long-eared two-rowed varieties. The secret remains to be discovered. It is also a question in what way the pollen gets itself discharged within the close flowers. But, however it is done, whether by a proper ejecting force in the anther, or by the filament pushing the lower end of the anther uppermost, and so letting the pollen run out mechanically from the waving of the ear, fecundation is more successfully accomplished in the close flower than in the open; for

while in the Barleys which open their flowers barren florets are frequent, defects of this kind in the Italian are very rare. Neither is it the case in this country that Oat flowers do not open in wet weather. They do not open so freely in gloomy wet weather as in warm sunny weather; but a floret may remain shut during a day or a week of damp weather without discharging its pollen, and open for fecundation afterwards. The upper flowers of the Oat panicle are often in blossom before the lower are out of the sheath. One floret arrives at puberty, so to speak, before another on the same ear, and even in the same spikelet. With the exception of the Barley referred to, the circumstances attending the flowering of Wheat, Rye, Barley, and Oats are closely similar. In a field of any of these grasses, especially Rye, on a good flowering day, clouds of pollen may be seen passing over the slightly waving spikes. That grains from one flower may alight on the stigmas of other flowers is certainly possible and probable, but that cross fertilisation takes place in this way, or takes place at all, is perhaps not yet rigorously proved. Unquestionably insects are no part of the agency of fertilising the cereals, neither is it perhaps correct to say that the wind is an agency in the same sense as it is in dioecious plants. The essential agency is probably the sudden extension of the filaments causing a few grains of pollen to be emptied out of the anthers before they are entirely ejected from the flower-cup.—“Notices of Botanical Excursions made in 1872 and 1873 (No. 1).” By Prof. Balfour. On the 2nd October a party ascended Ben Lawers; although it was late in the season they saw a number of alpine plants during the ascent. Among these may be mentioned *Saxifraga aizoides*, *stellaris*, *oppositifolia*, *hypnoides*, *nivalis*, *Alchemilla alpina*, *Epilobium alpinum* and *alsinifolium*, *Thalictrum alpinum*, *Rubus Chamæmorus*, *Cornus suecica*, *Cherleria sedoides*, *Lycopodium clavatum*, *alpinum*, *Selago*, and *selaginoides*, abundance of *Sagina nivalis*, various forms of *Spergula*, *Juncus triglumis*, and *Juncus trifidus*. At the summit *Saxifraga cernua* in leaf, and *Draba rupestris* in fruit. On 3rd October, at the summit of a lofty hill, which was supposed to be Mael-nan-Tarmachan, which on the survey map is stated to be 3421 feet above the level of the sea, Mr. I. B. Balfour was so fortunate as to discover an abundance of *Gentiana nivalis* in fruit. Among other plants of notice gathered were *Saussurea alpina*, *Hieracium alpinum*, *Carex atrata*, and *Saxifraga nivalis*. In the woods were a number of interesting Fungi, *Agaricus saccatus*, *A. æruginosus*, *Craterellus cornucopioides*, *Cantharellus cinerea*, *C. cibarius*, *Leotia lubrica*, *Hydnum repandum*, *Clavaria fusiformis*, and *C. cristata*. In April, 1873, *Hypnum Halleri* was gathered on Cam-a-Craig, the second station for the plant in Scotland.—“On an Extraordinary Case of Bleeding in a Hornbeam Tree.” By Sir John Don Wauchope, Bart. Communicated by Prof. Balfour.—“Open-Air Vegetation at the Edinburgh Botanic Garden, 1873.” By J. McNab.

LINNEAN SOCIETY.—April 3rd. Mr. Bentham made some further remarks on the Perigynium of *Carex* (see p. 123), and read a letter from Prof. McNab, of Dublin, who after studying *C. pulicaris* and *C. paludosa*, confirms Kunth's view, and not at all Mr. Bentham's staminal theory. The following botanical paper was read:—“An Enumeration of the Fungi of Ceylon. Part ii. Containing the

remainder of the *Hymenomycetes*, with the other tribes of Fungi." By Rev. M. J. Berkeley and C. E. Broome, Esq.

April 17th.—"Notes on the Development of the Perigynium in *Carex pulicaris*." By W. R. McNab.—"On the Morphology of the Perigynium and Seta in *Carex*." By W. T. Thiselton Dyer.—"On Burmese Orchideæ from the Rev. C. P. Parish." By Prof. Reichenbach; communicated by George Bentham, Esq.

May 1st.—Mr. D. Hanbury exhibited a head of fruit of a species of *Banksia* produced in his garden at Clapham.—Mr. J. E. Howard read a paper on the genus *Cinchona*. He reviewed the recent publications of Weddell and Triana on the subject, and gave a revised arrangement in which a number of the described species were reduced to races and varieties of a few well-marked super-species. Numerous growing plants of *C. officinalis*, *C. Calisaya*, and *C. Pahudiana* were exhibited, which showed great variation in the foliage in the case even of plants produced from the seeds of a single capsule. The author insisted on the necessity of propagating the best sorts entirely by cuttings.

June 5th.—"On the *Lecythidaceæ*." By J. Miers. The paper began with a history of the *Myrtaceæ*, in which botanists in general have included the *Lecythideæ* as a tribe, Lindley alone treating it as a distinct natural order, in which view the author thoroughly accorded. The group under consideration differs from the *Myrtaceæ*, not only in its alternate and impunctate leaves, but in the very important distinction of an epigynous disk; while in *Myrtaceæ* the disk is perigynous, with numerous stamens upon long filaments articulated upon it. On the other hand, in *Lecythidaceæ* the very numerous stamens, consisting of very short filaments and generally very small anthers, are each borne upon a distinct linear appendage forming parts of a very peculiar process—the androphorum—which is the leading characteristic, and to which we find no parallel in any other family. In *Gustavia* this takes the shape of a depressed globe or broad cup, the margin of which is deeply lacinated into numerous linear appendages; and the interior of this cup is densely imbricated with similar appendages, gradually shortening towards the centre, and all staminiferous at their apex, and all curving gradually and converging over the style. These appendages have generally been regarded as filaments, but they are of a different nature. The bottom of this cup is open in the centre over the vertex of the ovary, which forms the space within the epigynous disk. The inner rim of this cup-shaped portion is agglutinated to the disk by the intervention of the fleshy claws of the large petals; so that on the withering of the flower the petals, still agglutinated to the androphorum, all fall off together, leaving the disk bare. The androphorum varies in shape in the several genera. In *Gustavia* it is large, equally expanded all round, with long appendages, as above described; that of *Grias* approaches it in form, but it is much smaller, with fewer shortish appendages; in *Cariniana* it is urceolate, slightly gibbous on the margin, which is deeply cleft into many staminiferous appendages, as in *Gustavia*, the inside being bristled with similar appendages, growing in descending series, gradually smaller towards the centre. But in all the other genera the androphorum assumes quite another appearance. In these the central

portion of the cup is greatly contracted into a narrow, flattish ring, overlying the disk, and is there furnished inside with numerous erect, very short, staminiferous appendages; and then it assumes a very notable expansion on one side only, where it is called the ligula, in the form of a fleshy, broad, upcurving strap, bare of appendages, and then becomes further expanded into a concave hood, inverted over the disk, and densely echinated inside with long appendages, like those of *Gustavia*, all incurving in many series, and converging over the style, some of which are sometimes staminiferous, but often bare of stamens. Such form of the androphorum is seen in *Couroupita*, *Bertholletia*, *Lecythis*, *Eschweilera*, *Chytroma*, *Jugastrum*, *Couratari*, and *Allantoma*; but in *Cercophora* the hood is pouch-shaped and quite bare of appendages. The inferior ovary is 4—6-celled in *Gustavia*, *Couroupita*, *Bertholletia*, *Lecythis*, and *Chytroma*; 3-celled in *Couratari*, *Cariniana*, and *Allantoma*; and only 2-celled in *Eschweilera* and *Jugastrum*. The fruit is generally large, often very large, thick, and woody, opening by a deciduous operculum, which is an expansion of the vertex of the ovary, the main body of which grows into a large, ovate, turbinate, or cylindrical pyxidium, and about the middle or above it is a transverse line called a calycary zone, formed by the vestiges of the limb of the calyx, sometimes enlarged into conspicuous knobs. Above this, and below the opercular zone, is a broad, somewhat erect or conical band, rarely narrow, formed always by the expansion of the disk. Sometimes this fruit is filled with pulp generated by the softening of the dissepiment and placentæ, as in *Gustavia*, *Couroupita*, and *Lecythis*; it is void of pulp in the others. The seeds, often very large, are suspended by fleshy funicles as large as themselves, in the three last-mentioned genera. The occurrence of this circumstance in *Lecythis* was unknown to botanists until now, when the author exhibited proof of it by specimens preserved in alcohol; and it is on this account, and because they are so suspended, that he has separated from the genus more than half of the species hitherto placed there. In *Bertholletia* the large triquetrous seeds, with a woody testa, are dry, erectly affixed by a nearly basal hilum to the columella. In *Chytroma*, a genus 4-celled as in *Lecythis*, there is no columella, no pulp, and few erect seeds fixed in the bottom of the cells. In *Eschweilera* and *Jugastrum*, with a thin coriaceous pericarp, which is 2-celled, without columella or pulp, the seeds are erect as in *Chytroma*, all with a much thinner testa. In *Couratari* and *Cariniana* the seeds have a broad membranaceous wing, surrounding a small embryoniferous scutcheon, and are erect, fixed near the bottom of a large hard columella. In *Allantoma* they are long, narrow, compressed, rugous, erectly fixed in a similar manner. The embryo in all cases is without albumen. In *Gustavia* it consists of two plano-convex cotyledons, with a minute terminal radicle. In *Couroupita*, *Couratari*, and *Cariniana* it is hippocrepiform, with a long terete radicle and two large foliaceous cotyledons, crumpled up into a small space. In *Bertholletia*, and *Lecythis* it is very large, white, fleshy, and edible. In *Chytroma*, *Eschweilera*, and *Jugastrum* it is of a lurid green and very bitter, all equally macropodous or of one homogeneous texture. In these macropodous embryos we recognise a gigantic radicle, consisting of two portions, agglutinated together, one enveloping the

other. The outer one, the exorhiza, is thinner, terminating in two cotyledons, so extremely minute as to be scarcely discernible; and beneath these is seen the plumule, forming the termination of the neorhiza. In germination the neorhiza expands, the plumule forces its way through the cotyledons to form the ascending stem of the new plant, while the opposite extremity protrudes downwards to form the root. Of this peculiar mode of germination we find parallel examples in *Barringtoniaceæ*, *Rhizophoraceæ*, *Rhizobolaceæ*, and in *Guttiferæ*, as the author exemplified in the Linnean Transactions nearly twenty years ago. He divided the family into twelve genera, and described numerous interesting points of structure, hitherto quite unrecorded, showing a varied development of great peculiarity. He considered that it offers no single feature that bears an approach to *Myrtaceæ*, and that it is impossible to regard the *Lecythidaceæ* in any other light than as a very remarkable and distinct natural order.

Botanical News.

ARTICLES IN JOURNALS.—JUNE.

Journ. Linn. Soc. (June 20th).—G. Bentham, "Notes on the Classification and Geographical Distribution of the Compositæ" (tab. 8—11).

Grevillea.—M. J. Berkeley, "Notices of N. American Fungi" (contd.)—M. C. Cooke, "Two British Moulds" (*Verticillium agaricinum*, Bon., *Ædocephalum roseum*, Cooke).

Botanische Zeitung.—R. Hartig, "Preliminary Notes on the Parasites of Forest Trees."—H. Hoffmann, "On *Geaster coliformis*, P." (tab. 4).—H. G. Reichenbach, fil., "Three *Masdevallieæ* from New Grenada."—G. Kraus, "Remarks on Summer Withering of Leaves of Trees."

Flora.—A. W. Eichler, "Are the *Coniferæ* Gymnospermous?"—F. Schultz, "Remarks on the Flora of the Palatinate" (contd.)—A. Ernst, "On *Elateriopsis*, a New Genus of Cucurbitaceæ from Caracas" (tab. 2).—Gibelli, "The 'Quebracho Colorado' *Tipuana speciosa*, Benth." (tab. 3).

Oesterr. Bot. Zeitsch.—M. von Tommasini, "The Flora of Southern Istria."—L. Celakovsky, "On *Hieracium collinum*, Gochnat."—A. Kerner, "Distribution of Hungarian Plants" (contd.).—A. Rehmann, "Diagnoses of *Hieracia* of Galicia" (contd.).—W. O. Focke, "On the Formation of Species" (contd.).—V. de Janka, "Plant. nov. Turcicarum breviarium" (*Mæhringia Grisebachii*, n.s., *M. Jankæ*, Gris. ms., *Dianthus nardiformis*, n.s., *D. aridus*, Gris).

Botanisk Tidsskrift (1873, pts. 1 & 2).—C. Gronlund, "Contributions to the Flora of Iceland" (*Hepaticæ* and *Musci*).—C. Hansen, "List of Diatoms found in Slesvig."—R. Pedersen, "What part does

Bifurcation of the vegetative cone take in the Ramification of Phanerogams?" (tabs. 1 & 2).—P. Nielsen, "Vegetation of South-west Zeeland" (with botanical map).

New Books.—H. Christ, "Die Rosen den Schweiz" (Basel).—E. Hampe, "Flora Hercynica" (Halle, 7s).—F. C. Schübeler, "Pflanzen-geographischen Karte über das Königreich Norwegen" (Christiania).—G. Hieronymus, "Beiträge zur Kenntniss der Centrolepideen" (Halle, 8s.).—A. Keyserling, "Polypodiaceæ et Cyatheaceæ Herbarii Bungeani" (Leipzig, 3s.).

The Botanical Exchange Club has printed and distributed its list of desiderata for 1873. The Curator's Report has not yet however been issued.

The death of the Dean of Winchester, the very Rev. Thomas Garnier, D.D., at the great age of 98, must not be allowed to pass without notice. For many years past he had occupied the position of being the oldest Fellow of the Linnean Society, having been elected in the last century, in 1798, only ten years after the foundation of the Society. He was a contemporary of Sir J. E. Smith, Sir Joseph Banks, Curtis, Pulteney, and others of a past generation of botanists. Under the signature 'L. S. S.' he, with Mr. Poulter, contributed to vol. i. of the "Hampshire Repository" (1798) a list of some of the rarer plants of Hants—"hereafter to be continued, and to be finally extended to a complete Flora Hantoniensis"—occupying six pages, and illustrated with a coloured figure of the white-flowered variety of *O. apifera* from Bordean Hill. The magazine also contains, with the same signature, a description with a coloured plate of a "nondescript *Ophrys*," which flowered "for the first time it is believed in this kingdom October, 1796, and the two succeeding autumns at Meonstoke Parsonage," and seems to be *Spiranthes cernua*. He also contributed a paper on the culture of the Strawberry to the Horticultural Society's Proceedings.

It is thought desirable by the Council of the Pharmaceutical Society to extend the small herbarium of medicinal plants at present in their possession, so as to include specimens of medicinal plants from every quarter of the globe, whether officinal or non-officinal, and thus render it available for reference to those who are interested in the identification of medicinal plants, or in the determination of the sources of the *Materia medica* of foreign countries. Pharmacutists living abroad are especially requested to assist in carrying out this project; and Mr. Holmes, the Curator of the Pharmaceutical Society's Museum, will be happy to correspond with all who are willing to help. We trust this appeal will be cordially responded to in all quarters. Such a herbarium is really much wanted in London for the use of students of Pharmacy, who are at present frequently obliged to turn over the long series of species, very few of which are of medicinal interest, contained in the great herbaria of the British Museum or Kew in search of the specimens they wish to consult, at a great cost of time and trouble.

Original Articles.

ON HYDNORA AMERICANA, R.Br.

BY JOHN MIERS, F.R.S.

(TAB. 135A.)

THE species of *Hydnora* here described was first made known in 1844, by Mr. Rob. Brown, under a brief diagnosis in the supplement to his celebrated memoir on *Rafflesia*, published in the Linnean Transactions. It was established upon a solitary specimen in the possession of Sir Wm. Hooker, collected most probably by Dr. Gillics in the desert plains of the province of Mendoza; but it was evidently incomplete, because Mr. Brown described it as being dioecious. I had previously collected the same plant in the year 1826, making a drawing of it on the spot; and on my arrival in Buenos Ayres shortly afterwards, I made a coloured drawing from the specimen I had preserved. Upon the publication of Mr. Brown's memoir in 1844, I took the specimen and drawing to him, with which he was, of course, greatly pleased. They were left with him for examination, and were not returned. Subsequently to his death in 1859, I applied to Mr. Bennett, but after a diligent search in Mr. Brown's collections, neither the specimen nor drawing could be found. A considerable time after Sir Wm. Hooker's death in 1865, I received from Dr. Hooker my mislaid drawing, which he had found among his father's papers; but as the specimen did not turn up, I concluded it had been lost. A short time ago, in conversation with Dr. Reichenbach on this subject, it occurred to me that it would be desirable to place on record my remembrance of this curious plant, and with this view the following description is given:—

HYDNORA AMERICANA, R.Br., Linn. Trans. v. xix., p. 245: hermaphrodita, parasitica; *perianthio* tubuloso, superne inflato et pyriformi, crassiuscule coriaceo, extus leviter verruculoso, hepaticè rubiginoso, intus pallide carneo, fere ad basin in segmentis 3 æqualibus valvatis paullo apertis fisso. *Staminibus* numerosissimis in massas seu *connectivos* 3 magnos carnosos segmentis oppositos insessis, connectivis imo in annulum epigynum nexis: *antheris* linearibus, extrorsis, parallelis, creberrime adnatis, rima longitudinali dehiscentibus: *stigmatibus* lato, magno, supra *discum* crassum epigynum sessile, *staminibus* abscondito: *ovario* infero, 1-loculari, *ovulis* numerosissimis, niveis, ad placentas sub-globosas per paria apice suspensas creberrime insitis: *fructu* adhuc invisus: *v. v.* in prov. Mendoza, ad Coro-corto (mihi lecta): *v. s.* in Mus. Kew (specim. immat.), prov. Tucuman, prope Santiago del Estero (Tweedie).

Coro-corto is a small village in the desert plain lying between

Mendoza and San Luiz, 780 miles west of Buenos Ayres and 103 miles east of Mendoza. I cannot remember the plant upon the root of which it grew.

Tweedie's specimen is smaller, and less developed; but it shows its long root, and confirms all that is related above. It came from a similar saline district, which may be considered a far extension of the Travesia of Mendoza.

DESCRIPTION OF PLATE 135A.

Fig. 1. The flower of *Hydnora americana*, opening by its 3-valved perianth. Fig. 2. The same more expanded, showing the mass of stamens. Fig. 3. The same seen obliquely, showing in a cross section of the ovary the three pairs of ovuliferous placentæ, suspended from the summit of the cell. Fig. 4. The same, with half of the perianth removed, to show the masses of stamens, and the suspended placentæ: *all natural size*.

ON MARUPÀ, A NEW GENUS OF SIMARUBACEÆ.

BY JOHN MIERS, F.R.S.

(TAB. 135B.)

AMONG the products from Parà, exhibited in the Paris Exposition in 1867, I found a small branch and fruits only, preserved in alcohol, named "*Marupà, ou Simarouba*" (Cat. p. 75, No. 438), and among the woods from the same province I saw a sample called "*Marupà, ou Páo Pombo*." These I recognised immediately as belonging to a plant, in flower only, described in the "*Annales des Sciences Naturelles*," by Sen. Netto, a Brazilian botanist, and named by him *Odina Francoana*, and bearing the vernacular name of *Páo Pombo*. My analysis of the fruit shows it does not belong to *Odina* in *Anacardiaceæ*, which genus is confined to the Old World, but to *Simarubaceæ*, as the Brazilian contributor shrewdly concluded. The specimen of the fruit belongs either to the same or a kindred species; but as it is not accompanied by the leaves it is impossible to determine this, and I have therefore assumed they belong to the same species. The fruit was not known to Sen. Netto, and it is to be regretted that his description and drawing of the floral structure are not sufficiently clear; his *fig. 6*, the ♂ flower, shows 5 distinct sterile ovaries, standing erect upon a 10-lobed gynophorus, while 10 fertile stamens, with long simple slender filaments, are placed outside the latter: his *fig. 7* shows a section of the female flower: his *fig. 9* gives a magnified view of the solitary fertile ovary seated on the gynophorus, and surmounted by 5 remote short styles and stigmata, the gynophorus being surrounded at its base by the sterile stamens. There must be a great mistake here which his description does not explain; for as the latter figure (a magnified view of the ovary) shows no indication of the sterile ovaries upon the gynophorus, only a single ovary, surmounted by 5

remote short styles and stigmata, the inference is clear that it was intended to represent a compound pistil, formed of 5 united carpels, of which only one is fertilised, as seen in the section, *fig. 7*: hence, if this were true, we ought infallibly to find in the fruit the vestiges of the central axis and of the abortive cells, but no such indication exists. It is acknowledged that the ♂ flower has 5 distinct erect carpels, each with its own style and stigma, and therefore we ought to find in the ♀ flower 5 similar carpels: accordingly we have evidence of this, as shown in the fruit, where 4 of the carpels are atrophied at an early stage, only one of them becoming fertilised, as often happens in *Simarubaceæ*. The fruit is obovate, seated on the persistent gynophorus, at the base of which are the unchanged sepals, and on one side, and at the base of the fruit outside, are plainly seen the vestiges of the abortive carpels within the hollow formed by the creniform lobes of the gynophorus. The epicarp is obovate, quite smooth, thin, and flaccid, deeply umbilicated on the ventral upper angle, and in this hollow is seen the punctiform stigma, where it is attached to the mucronate apex of the putamen; it is filled with a copious, thickish, mucilaginous mesocarp. The endocarp is an osseous putamen, shorter than it, dolabriform, compressed, and corrugated, erect on the ventral side, and there mucronated at its apex, where it is attached to the epicarp at the stigmatic point: on that side the putamen is thickened by a hollow channel, in which a thick cord of nourishing vessels ascends from the gynophorus to near the summit, when it is suddenly retroflected, and enters the cell at the hilar point of suspension of the seed. It contains only a single seed, of a reniform-oblong shape, shorter than the cell, and it is suspended at its superior angle by a small hilum: it has a very thin chartaceous testa, furnished with a short raphe descending from the hilum to a little below the middle of the ventral edge, terminating there in a chalaza placed in its sinus: the embryo fills the testa, is exalbuminous, and consists of 2 compressed, reniform-oblong, plano-convex, fleshy cotyledons, with a small superior radicle placed in a verticle recess, inclined so that it turns away from the hilum, though not far removed from it.

These details show that *Marupà* is far remote from *Odina*, that it does not belong to *Anacardiaceæ*, but to *Simarubaceæ*, where it will form a distinct genus, not according with any known one of the order. It cannot be referred to the *Æschryon* of Velloz (wrongly placed in *Picrasma* by Planchon), and which is considered in the Gen. Pl. of Benth. and Hook. (i, 311) as identical with *Munteria*, Walp. (*Picræna* Lindl.): this differs from *Marupà* in its 4 sepals and petals, 4 stamens fixed inside the free ciliated lobes of the disk, placed round a solitary sessile ovary, with a sessile stigma; so that, having no gynophorus, it must belong to *Anacardiaceæ*. *Picrasma* differs from our genus in its 4 free fertile ovaries, seated upon a raised gynophorus, which carries in its centre between them a 4-grooved style, equal to them in length, supporting 4 long reflected stigmata, all free from the ovaries, in having ascending ovules in each carpel, and in having albuminous seeds. *Marupà* comes nearer to the *Picrolemma* of Dr. Hooker, which differs from it in having 4-merous parts in the ♂, and 5-merous in the ♀; in its 5-partite fertile ovary, consisting of 5 free carpels, united at their base by a gland, which bears a single style and

capitate stigma; and in the thin crustaceous putamen in the fruits. The genus greatly resembles *Samadera* in the size and structure of its fruit, but it differs in its sepals not glandular outside, its stamens not squamulose at base, in its styles not united and elongated in the middle of the free ovaries, in the drupe not being alately carinated, in its pinnated leaves, and its much smaller flowers. I have not seen the flowers of *Marupà*, the characters of which, as sketched below, are chiefly derived from Sen. Netto's description:—

MARUPÀ, nob.: *Odina* Netto (non Roxb.) *Flores* polygami, parvi: *Sepala* 5, parva, acuta, concava, persistentia, glabra. *Petala* 5, sepalis multo majora, ovalia, concava, carnosula, patentia, decidua. *Stamina* in utroque sexu 10, petalis breviora, circa basin gynophori affixa, erecta: *filamenta* teretia, simplicia, glabra, distincta: *antheræ* ovoidæ, 2-lobæ, in ♀ effætæ. *Gynophorus* cylindricus, apice crenato-10-lobatus, concavus, immutato-persistens. *Ovaria* in ♂ 5, staminibus breviora, teretia, supra gynophorum in centro erecto-conniventia, stigmatibus minutis apiculata, omnino sterilia: in ♀ 5, eodem loco insita, quorum 4 semper minuta et abortiva, unico fertili, ovoideo, (stigmati sessili apiculato?) 1-loculari, ovulo unico reniformi appenso. *Fructus* majusculus, drupaceus, gynophoro persistente stipitatus, gibbosus-ovatus, apice rotundatus et ibi sub-lateraliter profunde umbilicatus et stigmati minuto notatus: *pericarpio* tenuiter chartaceo, flaccido; *mesocarpio* amplo, mucilaginoso; *endocarpio* (seu *putamine*) nuciformi: *putamen* dolabriformi-obovatum, valde compressum, ad marginem ventralem rectum apice mucronatum, osseum, faciebus bullatim corrugulatum ad marginem ventralem crassius chorda gynobasica percursum, ista intra canalem fere ad apicem adscendente et subito ad punctum placentiferum reversa, 1-loculare, monospermum. *Semen* loculo brevius, reniformi-oblongum, compressum, paullo sub angulum ventralem suspensum; *testa* membranacea, *raphe* brevi ab hilo apicali et ad *chalazam* sub-medianam descendente notata: *embryo* conformis, exalbuminosus; *radicula* minima, teres, in sinu apicali occlusa, hilo oblique effugiens; *cotyledones* 2, æquales, reniformi-oblonga, plano-convexa, carnosula, commissura *chalazam* ventralem spectante.

Arbor *Brasiliensis*: folia impari-pinnata: inflorescentia paniculata: flores minimi, albidii, glomerato-spicati.

1. MARUPÀ FRANCOANA, nob.: *Odina Francoana* Netto, in Ann. Sc. Nat., 5 ser. v. 85:—undique glaberrima: foliis bijugatis impari-pinnatis, sub-laxe patentibus, breviter petiolatis, foliolis obovatis, imo cuneatis, apice subacuminatis, integris, supra viridibus, subtus rufule discoloribus, petiolulis brevibus; petalis albidis; ovario pubescente; stylis glabris. In prov. Minas Geraës, in campis prope Rio San Francisco et in prov. Parà: non vidi.

A tree 20—23 feet high, with leaves 6 inches long, and leaflets 4 inches long, 10 lines broad, on petiolules $4\frac{3}{4}$ lines long; fruit $1\frac{3}{4}$ inches long, 1 inch broad, on a gynophorus 1 line high, which is furnished at its base by 5 persistent sepals $\frac{1}{4}$ line long. The wood, of which I saw a sample in the Paris Exposition, is of a whitish colour, with darker streaks, with a fine grain, and easily worked. The fruits are eagerly sought by pigeons, who feed on them, and hence the tree is called *Páo Pombo*. This must not be confounded with the *Fruta*

de Pomba from the province of S. Catharina, which affords a fine wood, and of the fruits of which pigeons are extremely fond. This is the *Erythroxylon anguifugum*, Mart.: others bearing the same name are *E. subrotundum*, St. Hil., from Cape Frio, *E. Pelleterianum*, from Minas Geraës, &c.

DESCRIPTION OF PLATE 135B.

Fig. 1. A fruit on its flowering branch: *natural size*. Fig. 2. Part of the pedicel, the persistent sepals, the elevated gynophorus with a 5-lobed margin, showing within its hollow summit the cicatrix of attachment of the fruit and 4 abortive ovaries: *magnified*. Fig. 3. A fruit, with half of the pericarp removed, showing the points of attachment of the putamen: *nat. size*. Fig. 4. The putamen. Fig. 5. The same, seen on its edge. Fig. 6. A longitudinal section of the same, showing the ascending cord of nourishing vessels retroflected at its summit, the seed attached to the same, with its chalaza. Fig. 7. The seed detached, showing the short raphe and the chalaza placed a little below the sinus. Fig. 8. The exalbuminous embryo, with the testa removed, showing the apical small radicle, turned away from the hilum. Fig. 9. The same seen edgeways: *all natural size*.

SYNOPSIS OF THE EAST INDIAN SPECIES OF DRACÆNA AND CORDYLINE.

BY J. G. BAKER, F.L.S.

DRACÆNA, *Vand.*, Kunth Enum. v., 2.

Flowers usually fascicled on the rachis, irregularly bracteated; cells of the ovary uniovulate; stigma capitate, with three minute lobes.*

1. *D. FINLAYSONI*, *Baker*—*D. graminifolia*, Finlay. & Wall. in Wall. Cat., 5149, non Linn. Flower-bearing branches not more than $\frac{1}{4}$ inch thick. Leaves ascending, the bases about $\frac{1}{4}$ inch apart, narrow ensiform, 15—18 inches long, $\frac{1}{2}$ — $\frac{5}{8}$ inch broad at the middle, narrowed gradually to an acute point, very slightly narrowed above the dilated base, which clasps all round the stem and quite hides the internodes; the texture firm, arundinaceo-coriaceous; the colour green; the midrib obscure on the upper surface, distinct on the lower side in the lower half of the leaf only; the veins very fine, immersed, not oblique; the edge concolorous. Inflorescence a distinctly-stalked, lax, simple spike or deltoid panicle reaching to more than a foot long, with a few long simple ascending racemose branches. Flowers in distant fascicles, from three to as many as half-a-dozen in a cluster. Bracts minute, deltoid. Pedicels not more than a line long, jointed near the apex. Perianth slender, cylindrical, 8—9 lines long, the narrow divisions about as long as the tube, the anthers included and stigma finally

* The character of the absence of stolons, relied upon by Regel to separate flowerless *Dracænas* from *Cordylines*, does not invariably hold good.

exserted.—Pulo Dinding, Straits of Malacca—Finlayson; Borneo—Barber, 248. The garden *D. stenophylla*, K. Koch. (Regel Revis., p. 42), of which the native country and flowers are unknown, may possibly be a form of this with variegated leaves.

2. *D. ANGUSTIFOLIA*, Roxb. Fl. Ind. ii., 155; Wall. Cat., 5141.; Kunth Enum. v., 4; Regel Rev., p. 36—*D. ensifolia*, Wall. Cat., 5143; Kunth Enum. v., 5, non Regel Revis., p. 39 (“Gartenflora,” t. 451)—*Terminalia angustifolia*, Rump. Amboin. iv., t. 35—*D. fruticosa*, Regel Revis., p. 37—*Cordyline Rumphii*, Hook Bot. Mag., t. 4279, in greater part as regards synonyms cited, but excluding the plant figured—*D. lancea*, Thunb. in Dalm. Diss., p. 3?. Flower-bearing branches $\frac{1}{4}$ — $\frac{1}{2}$ inch thick. Leaves ascending, the centre of the bases $\frac{1}{8}$ — $\frac{1}{4}$ inch apart, sessile, ensiform, 12—18 inches long, an inch broad at the middle, narrowed gradually to an acute point, and to 3—4 lines above an amplexicaul base that clasps the stem all round and quite hides the internodes; colour plain green; texture arundinaceo-coriaceous; the midrib obscure on the upper side, distinct on the lower side, except near the tip; lateral veins very fine, close, immersed, not at all oblique. Panicle terminal, short-stalked, reaching a foot or more in length, with few or many spreading or ascending branches, the lower sometimes again compound, bracteated by reduced leaves 3—4 inches long. Racemes lax, not more than half a foot long, $1\frac{1}{2}$ —2 inches broad when expanded. Flowers 1—4-nate, the clusters distant on the rachis. Bracts deltoid, scarious, 1—2 lines. Pedicels 3—4 lines long, jointed above the middle. Perianth greenish-white, 8—9 lines long, the divisions about equalling the cylindrical tube. Stamens as long as the divisions, the stigma at last slightly exerted. Berry from one to three-lobed, pulpy deep orange, each lobe the size of a marrow-fat pea, containing one large round horny seed.—East Himalayas (Assam, Khasia and Sillet), ascending from the base of the hills to 6000 feet—Wallich, 5143! Griffith, 5871! Hooker fil. & Thomson!; Burmah—Wallich, 5141C! McClelland!; Java—Spanoghe! W. Lobb!; North Australia—Damel! Schultz! &c. If the plant cultivated at Kew under the name *ensifolia* be the same, as seems most likely, this forms when full-grown a trunk half-a-foot thick, with several dichotomous forks, each crowned with a dense coma of from 50 to 100 much reflexing leaves, which reach $1\frac{1}{2}$ —2 feet in length and $1\frac{1}{2}$ inch broad at the middle, and clasp the stem for a couple of inches. Most likely it will prove to be Thunberg’s *lancea*, and if so that is the oldest name. Most likely, also, it is the *ensifolia* briefly characterised by Haworth, Synopsis, p. 67. There is a very good (unpublished) plate amongst Roxburgh’s drawings.

3. *D. PORTERI*, Baker—*D. maculata*, Wall. Cat., 5148A, non Roxburgh. Flower-bearing branches under $\frac{1}{4}$ inch thick. Leaves ascending, their bases $\frac{1}{4}$ inch apart, clasping the stem all round, not completely hiding the internodes, oblanceolate-ensiform, $\frac{1}{2}$ —1 foot long, $1\frac{1}{2}$ inch broad at the middle, narrowed gradually to an acute point and downwards to 3—4 lines above the dilated base, firmer and more coriaceous than those of the last; the midrib invisible from above and only obscurely seen near the base on the lower side; the veins very fine, copious, and immersed. Flowers in a long-stalked simple raceme half-a-foot long, the peduncle bracteated with reduced leaves.

Flowers 2 to as many as 5 together in distant fascicles. Bracts minute, deltoid. Pedicels not more than a line long, jointed at the middle. Perianth very slender, 8—9 lines long, greenish-white, the divisions about as long as the cylindrical tube. Style finally exserted.—Penang, “A small plant from the hills”—Porter in Wall. Herb., No. 5148A! This may prove a mere variety of *spicata*, but appears so different in the leaves that with our present material we do not seem justified in combining them.

4. *D. SPICATA*, Roxb. Fl. Ind. ii., 157; Kunth Enum. v., p. 10; Wall. Cat., 5146; Regel Revis., p. 44—*D. Wallichii*, Kunth Enum., p. 11; *D. terniflora*, Roxb. Fl. Ind. ii., 159, non Wall., 5147A, B—*D. Heyneana*, Wall. Cat., 5154—*D. terminalis*, Wt. Icones, t. 2054, non Lam. Flower-bearing branches 3—4 lines thick. Bases of the ascending leaves near the top of the shoots about $\frac{1}{4}$ inch apart, quite hiding the internodes. Leaf oblanceolate, 6—9 inches long by $1\frac{1}{2}$ —2 or rarely 3 inches broad at the middle, narrowed gradually to an acute point and very gradually to a distinct petiole 1—3 inches long, which enlarges again at the base to clasp all round the branch; colour uniform green; midrib obscure throughout on the upper side, distinct on the lower side in the lower half of the leaf only; veins fine, immersed, distinctly oblique. Flowers in a short-stalked, simple, or little compound raceme, which is moderately close, $1\frac{1}{2}$ —2 inches broad when expanded. Flowers often 2—4 in a cluster. Bract deltoid, scarious, those subtending the pedicels $1\frac{1}{2}$ —2 lines long. Pedicels 2—3 lines, articulated at the middle. Perianth greenish-white, 6—9 lines long, the divisions about as long as the slender cylindrical tube. “Berry with from one to three distinct round and smooth lobes; whilst immature a deep olive-green; when ripe deep reddish-orange, each lobe containing a single large smooth round white horny seed.”—Eastern Himalayas: Silet—Wallich Cat., 5146A!; Chittagong—Roxburgh, Hk. fil. & Thomson!; Khasia, 0-3000ft.—Hk. fil. & Thomson; Assam—Masters! Griffith, 5378!; Poneshie—Anderson! (Yunan expedition); Bombay—Dalzell! Stocks! Law!; Neilgherries—Wight! G. Thomson!; Andamans—Kurz!; Tenasserim—Griffith, 5878!; Penang, Singapore, and Malacca—Porter! Griffith, 5876! Maingay, 1684! Walker.

VAR. AURANTIACA—*D. aurantiaca*, Wall. Cat., 5149—*D. Jackiana*, Wall. Cat., 5145, *ex parte*—*D. terniflora*, Regel Revis., p. 46. More robust, with larger, more coriaceous leaves, the same shape as in the type, reaching $2\frac{1}{2}$ —3 inches broad in the middle, and a panicle sometimes more than a foot long, with several distant divaricating branches, and a very large orange-red berry.—Assam—Griffith, 5880!; Penang, Singapore, and Malacca—Wallich! Walker! Griffith, 5873! Maingay, 1685! 1688! This is the most widely-spread species of all in India, and will be found faithfully drawn in Wight's Icones under the name of *D. terminalis*.

5. *D. THWAITESII*, Regel Revis., p. 44—*D. elliptica*, Thwaites, Enum., p. 338. General habit just that of *spicata*. Petioles ascending, nearly or quite hiding the internodes. Blade oblong-lanceolate, 6—8 inches long, 18—21 lines broad at middle, narrowed to a long point and downwards to a distant petiole 2—3 inches long; texture arundinaceo-subcoriaceous; colour green; midrib distinct in

the lower half on the lower surface only. Flowers in a short-stalked, close, oblong, or deltoid panicle not more than 2—3 inches long, solitary or fascicled on the branches in twos or threes. Bracts minute, deltoid. Pedicels $1\frac{1}{2}$ —2 lines long, jointed above the middle. Perianth 4—5 lines long, the divisions rather exceeding the tube.—Ceylon—Walker! Gardner, 893! Thwaites, 2293! This appears to be the only wild Ceylonese form, and can scarcely be regarded as more than an insular variety of *spicata*.

6. *D. ELLIPTICA*, Thunb. in Dalm. Diss., p. 3?; Kunth Enum. v., 14?; Hook. Bot. Mag., t. 4787, excl. syn.—*D. javanica*, Kunth Enum. v., 12; Regel Revis., p. 45—*Cordyline Sieboldii*, Planch. Fl. des Serres vi., p. 132.—*D. terniflora*, Wall. Cat., 5147A (Kunth Enum. v., 11), non Roxb. Branchlets not more than 2 lines thick. Internodes near their summit $\frac{1}{4}$ — $\frac{1}{2}$ inch long, not hidden by the petioles. Blade oblong-lanceolate, 5—6 inches long, $1\frac{1}{2}$ —2 inches broad at the middle, cuspidate, narrowed rather suddenly at the base into a short distinct petiole which clasps all round the branchlet; colour plain green in the type; texture more coriaceous than in *spicata*; the midrib only visible towards the base on the lower side; the fine immersed veins oblique. Flowers in a sessile or short-stalked deltoid panicle seldom more than half-a-foot long, with ascending or spreading straight or curved branches. Flowers 1—3 from the distant nodes. Bracts minute, deltoid. Pedicels 2—3 lines, jointed at the middle. Perianth 8—9 lines long, stouter than in *spicata*, the divisions about equalling the tube, the stigma finally exserted, Berry globose, orange-red, usually one-lobed, about half-an-inch thick. Sillet—Wallich, 5147A!; South Andaman—Kurz!; Java and Sumatra—Spanoghe!, &c.

Var. *MACULATA*.—*D. maculata*, Roxb. Fl. Ind. ii., 157; Kunth Enum. v., 13—*D. elliptica*, Hook. Bot. Mag., t. 4787 (the figure)—*Cordyline maculata*, Planch Fl. des Serres vi., p. 132—*C. Sieboldii*, var. *maculata*, Planch Fl. des Serres, t. 569. Differs from the type only by its leaves having large irregular pale blotches on a green groundwork. There are two good figures, as just cited, and a drawing in the Roxburghian collection.

Var. *ATROPURPUREA*.—*D. atropurpurea*, Roxb. Fl. Ind. ii., 160; Kunth Enum. v., 13. Leaves just the same in texture, but more oblanceolate in shape, being somewhat longer in proportion to breadth (6—9 inches by 2—3 inches broad at the middle), and narrowed more gradually at the base; in this form uniformly suffused with dark vinous-purple, with which the flowers are also tinged.—East Himalayas (Sillet, Khasia, and Chittagong)—Roxburgh, Hook. fil. & Thomson!; Tenasserim—Griffith, 5877! Parish, 161!

Var. *GRIFFITHII*.—*D. Griffithii*, Regel Revis., p. 47—*D. terniflora*, Wall. Cat., 5147B. Leaves the same shape as in the last, but smaller (5—6 inches long by 12—15 lines broad), and green, not tinged with purple, the branches more slender, the branches of the panicle slender and spreading.—Khasia—Griffith, 5869!; Amherst and Chappedong—Wallich!; Mergui—Griffith, 5877!; Malacca—Maingay, 1686!; Borneo, near Bangarmassing—Motley, 202!; and a closely similar form gathered in the South Andamans by Kurz.

Var. *GRACILIS*.—*D. gracilis*, Wall. Cat., 5150. Branchlets very

slender, not more than $\frac{1}{8}$ inch thick. Leaves oblanceolate, green, narrowed to the base, 3—4 inches long, $\frac{5}{8}$ — $\frac{3}{4}$ inch broad at the middle. —Penang—Porter!, “A small plant from the hills.”

I cannot discover any safe ground for including *D. reflexa* and *D. Rumphii*, both of which are admitted by Regel, amongst East Indian species. The specimens of the former distributed by Wallich are from the Calcutta garden, and the garden plant named by Sir W. Hooker is evidently quite distinct from *D. angustifolia*, and most likely, like its near ally *D. latifolia* of Regel, South African.

CORDYLINE, *Commers.*

Flowers placed one by one on the axis, each subtended by an involucre of three bracteoles, of which the two upper are more or less connate. Cells of the ovary multiovulate. Style tricuspidate at the stigmatose apex.

1. *C. TERMINALIS*, Kunth Enum. v., 25—*Dracæna terminalis*, Roxb. Fl. Ind. ii., 157, non Wt. Icones, t. 2054—*D. ferrea*, Wall. Cat., 5150B, D—*D. Jackiana*, Wall. Cat., 5145, *ex parte*. Floriferous branches $\frac{1}{4}$ — $\frac{1}{2}$ inch thick. Leaves placed upon them $\frac{1}{4}$ — $\frac{1}{2}$ inch apart. Petioles half-a-foot long, erecto-patent, $\frac{1}{4}$ inch broad at the middle, dilated to $\frac{3}{4}$ inch at the amplexicaul base, which conceals the branches. Blade oblanceolate, arundinaceo-coriaceous in texture, green in the typical form, 15—18 inches long, 3—3 $\frac{1}{2}$ inches broad above the middle, rather rounded through the lower half to the base, the midrib distinct on both sides nearly to the tip, the veins very distinct and very oblique, all through leaving the midrib at the angle of 20 to 25. Inflorescence a distinctly stalked, very compound deltoid, terminal panicle, the lower branches subtended by reduced leaves 4—6 inches long, spreading at a right angle from the axis, and often again branched. Separate racemes reaching half-a-foot long, not very dense, under an inch broad when expanded, the flowers always solitary, subtended by an involucre of three scariose persistent deltoid bracteoles about a line long, of which the two upper are more or less connate. Pedicel not exceeding the bracteoles, articulated at the apex. Perianth $\frac{3}{8}$ — $\frac{1}{2}$ inch long, the ligulate divisions twice as long as the cylindrical tube. Stamens and style not exerted. —Penang and Singapore—Wallich! Walker, 286! and cultivated in the Botanic Gardens.

Var. 1. *ESCHCHOLZIANA*—*Cordyline Eschscholziana*, Mart. in Schult. Syst. vii., 347—*C. heliconiæfolia*, Otto and Dietr. Kunth Enum. v., 28—*Dracæna terminalis*, Lindl. Bot. Reg., t. 1749. Differs from the type only by its larger leaves, which are 5—6 inches broad above the middle.—Griffith, 5881! from the Calcutta garden. A native of Polynesia.

Var. 2. *FERREA*—*Dracæna ferrea*, Willd. Roxb. Fl. Ind. ii., 156; Wall. Cat., 5140A, C, E—*D. terminalis*, Jacq. Ic., t. 448—*Cordyline Jacquinii*, Kunth Enum. v., 23 Petiole shorter. Blade of the leaf not more than 2—2 $\frac{1}{2}$ inches broad above the middle, green or often more or less saturated with dark crimson, more acute and more

cuneately narrowed to the base. Panicle less compound, with less spreading branches. Perianth not more than 3—4 lines long. Pedicel shorter than the bracteoles.—Sillet—Gomez! Hook. fil. & Thomson!; Malacca—Maingay, 1689!; Ceylon—Col. Walker! (probably not wild there, as it is omitted by Thwaites). Commonly cultivated, and covering a large number of forms now circulating in the gardens under specific names. There is a beautiful plate amongst Roxburgh's drawings.

Var. 3. SIEBERI—*Cordyline Sieberi*, Kunth Enum. v., 23—*Dra-cæna terminalis*, Herb. Rottler. Only differs from the last by the pedicels, which exceed the bracteoles, but do not reach more $\frac{1}{8}$ inch in length.—Malacca—Griffith, 5872 bis! Rottler's specimen is from Java.

ERYTHROSTAPHYLE:

GENUS NOVUM, VERBENACEIS AFFINE,

ADUMBRAT H. F. HANCE, PH.D.

DIOICA? monoica? vel polygama? Flor. masc.—calyx parvus, 5-partitus, laciniis lanceolatis. Corolla rotato-campanulata, ad medium æqualiter 5-loba, lobis ovatis mucronatis, symptyxi leviter imbricatis. Stamina 5 antheræ introrsæ, biloculares, inter lobos corollæ juxta basin sessiles. Ovarii rudimentum minutum. Flores feminei ignoti. Drupa calyci haud accrescenti 5-partito insidens, succosa, stigmate discoideo, sessili, lateraliter affixo coronata, putamine grosse lacunoso, uniloculari, monospermo. Semen ovoideum, apice acutiusculum, albumine copioso, carnosum. Embryo in albuminis axi rectus, ejusdem fere longitudinis, teres; radícula supera; cotyledonibus oblongis, tenuissimis, foliaceis. Fruticulus sarmentosus, foliis oppositis, exstipulatis, floribus parvis, cymoso-paniculatis.

²²² *E. vitiginea*; sarmentosa, longe diffusa, caulibus subangulatis strigoso-tomentellis, foliis oppositis ovatis acuminatis basi subcordatis infra dense ochraceo-strigoso-velutinis supra nervis strigosis exceptis glabratissimis penniveniis membranaceis $2\frac{1}{2}$ — $4\frac{1}{2}$ poll. longis incluso petiolo semipollicari $1\frac{1}{2}$ — $2\frac{3}{4}$ poll. latis, cymis paniculatis longe pedunculatis foliis circiter æquilongis sæpe supra-axillaribus nunc ad cirrhos steriles reductis ochraceo-strigillosis, floribus strigosis ochraceo-flaventibus, calyce parvo, corollæ 2-lin. tantum diametro lobis antheras stramineas duplo superantibus, fructibus in cymas nudas digestis subpollicaribus vivide coccineis tomentosis, stigmate albido sessili circumscriptione orbiculari-reniformi oblique affixo (plane indusium *Aspidii* cujusdam referente), putamine nigricante lacunis acute marginatis insculpto, seminis putamen implentis testa fusco-grisea.

Inter frutices et super saxa, ad ingentem rupem calcaream Kai-kun-shek (h.e. "petra cristæ-galli"), secus fluvium Si-kiang seu

West River, provinciæ Cantonensis,* specimina ♂ florifera primus detexit clar. Sampson, d. 14 Julii 1870; eodemque loco specimina ♀ fructibus maturis onusta, me comite, invenimus, d. 20 Julii 1872. (Exsicc. n. 16858.)

Planta singularis, habitu facieque *Viti* cuidam tam similis ut, exemplaribus masculis floriferis tantum obviis, hisque nimis negliger inspectis, eam huic generi adscripsissem, suadente amico Thwaites, cui vero fructus haud innotuit, inter *Verbenaceas* juxta *Premnam* collocanda. A plerisque tamen *Verbenaceis* stigmate sessili,† drupæ putamine uniloculari, et albumine copioso;—ab omnibus, *Phryma* solummodo excepta, radícula supera discrepat, quo caractere *Myoporacearum* ordini accedit, a quibus profecto habitu omnino aliena. Stirps verisimiliter dioica, nam flores femineos vel ovaria evoluta in cymis masculis amplifloris frustra quæsi; sed specimina fructifera in eodem loco lecta fuerunt. De structura carpica ne minimum superest dubium; plures enim dissecui fructus, embryonemque, cotyledonibus magnis foliaceis plumula radículaque minimis instructum, ex albumine copioso integrum extraxi. Genus anomalum, ut videtur, ad calcem *Verbenacearum* rejiciendum.

DESCRIPTIONS OF SOME NEW SPECIES, SUBSPECIES,
AND VARIETIES OF PLANTS COLLECTED IN MOROCCO
BY J. D. HOOKER, G. MAW, AND J. BALL.

BY J. BALL, F.R.S.

THE numerous engagements of Dr. Hooker having prevented him from undertaking the examination and description of the plants collected in Morocco in an excursion made by us in 1871, it has fallen to my lot to perform that task. I have found it impossible to publish a descriptive catalogue of the flora of that country in a manner satisfactory to myself, without undertaking at the same time a revision of existing materials, and an examination of the published descriptions of such Mediterranean species as are included in the Morocco flora, as well as those of allied forms which have been found in the adjoining regions.

As the completion of this work may suffer some further delay, I have thought it desirable to offer to the "Journal of Botany" an account of some of the more interesting plants, hitherto undescribed, that were collected by Dr. Hooker and myself. Our companion, Mr. Maw, occupied himself chiefly in the collection of

* Sic certe, juxta Latinæ linguæ normam, rectius scribendum; nec *Cantoniensis*, uti cum omnibus ferme neotericis hucusque perscripsi.

† Nec in cl. Bocquillonii libello qui inscribitur "Revue du groupe des Verbénacées," neque in Benthamii "Flora Australiensi," ubi omnia fere genera Schauerio ignota recensentur, ullum reperi genus stigmate sessili donatum.

living plants, and some of these have already been published and figured in the "Botanical Magazine."

As might be anticipated by those acquainted with what has hitherto been published in illustration of the little-known flora of Morocco, the large majority of the new forms of vegetation observed by us come from the southern portion of the empire, and especially from the range of the Great Atlas. It is true that many of the most remarkable plants of the lower region of that great range were found in 1867 by M. Balansa, well-known for his successful botanical explorations in Algeria and Asia Minor, whose enforced departure from S. Morocco after a few days' stay at the northern base of the Atlas prevented him from making any considerable collections.

M. Balansa's plants were examined by M. Cosson, the botanist most thoroughly acquainted with the flora of Northern Africa, and the undescribed species received from him names which have not yet been given to the public. Through the kindness of M. Cosson we were furnished on leaving England in 1871 with a MS. catalogue of the species known to him as having up to that date been found within the boundaries of Morocco, and in that list appear the new acquisitions due to M. Balansa, with the names assigned to them by M. Cosson. Although no descriptions are affixed, there can be no doubt as to most of the plants thus designated. A few of them were received at the Kew Herbarium, and also by myself, in the distribution of the small set of duplicates brought back to Europe by M. Balansa; others are sufficiently identified by the localities where they were found, and some have been seen by me in the herbarium of M. Cosson. Nearly all the plants in question were subsequently found by Dr. Hooker and myself; but under the circumstances here mentioned, it will be understood that I have been unwilling to publish, as new, plants already in the hands of an eminent botanist especially qualified to deal with them, and I have been the more willing to abstain from so doing as I am led to hope that they may be very soon published by him.

The only remark that I desire to add regards the use of the term *subspecies* in the following pages. By some writers of authority, and especially M. Alphonse De Candolle, the term *subspecies* has been used as equivalent to the English and French term *race*—in other words, for a permanent variety, maintaining certain obvious characters that distinguish it from the parent species with a certain fixity for many successive generations. This was the only sense in which the term could have been used by naturalists who regarded the species as the fixed and permanent element in the classification of organised beings, susceptible of variation within certain narrow limits, but always capable of reverting to the original type.

Since the majority of modern naturalists have accepted a different fundamental view as to the relations of the varied forms of the organised world, it is obvious that the language of the systematist may require to be altered so as to correspond with the conceptions which he seeks to embody.

Until recently the term *species* was used to designate a group of organisms believed to be descended from the same original stock, susceptible of variation within certain limits, but restrained within

those limits, and separated from all others by impassable boundaries which the classifier sought to ascertain and to define. Differences naturally arose among naturalists in regard to the limits of particular species. Some were disposed to believe in a wider range of variation than others were willing to admit, and hence the same form might be classed as a variety by one systematist and as a distinct species by another; but there was a general agreement as to the criterion which should, if practicable, be applied. All the forms that had sprung from the same common stock were to be ranked as varieties. Distinct species were races that had descended from an ancestor, or pair of ancestors originally distinct. So long as this view prevailed there was nothing to be gained by attempting to distinguish between varieties more or less widely differing from the form which was regarded as the type, and the term *subspecies* had no recognised place in systematic works.

A radically different conception of the relations of organised beings has now been accepted by the majority of naturalists. It is believed that the tendency to variation which undoubtedly exists among the descendants of the same original is not restrained within fixed limits, and that in the lapse of long periods of time, and under the influence of varying external conditions, the descendants from a common stock may exhibit the differences that characterise distinct species, not to speak of the wider differences of structure that mark the groups which we call genus, tribe, or natural order. For those who have admitted this fundamental conception it is clear that the absolute distinction hitherto supposed to lie between species and variety no longer exists. Allied species, as well as allied varieties, are linked together by the tie of genetic relation, and although the differences may be far wider, it is impossible to assign a distinctive criterion, or to draw a line at which the variety ends and the species begins. One such criterion has, indeed, been suggested. The capability of producing fertile offspring by the union of individuals belonging to the same group may be an adequate test of identity of species among animals; but when applied to the vegetable kingdom it appears to be subject to such considerable exceptions as to render it scientifically invalid, even if it were generally applicable as a practical test. It appears certain that the union of forms as distinct as most of those ranked as separate species sometimes gives rise to fertile offspring, while there is reason to believe that undoubted varieties of the same stock occasionally produce none but infertile descendants.

It cannot be denied that the prevalence of the theory of evolution—mainly due to the genius and industry of Mr. Darwin—has rendered the task of the systematic naturalist far more difficult than it previously was. In classifying the forms of organised nature his work is not merely to embody facts—he must also interpret their significance; and for this, in the absence of positive criteria, he must rely on his own sagacity.

Speaking exclusively of the vegetable world, we find that most widely diffused plants give rise to numerous varieties which reproduce themselves by hereditary descent, forming what are called races. In the case of wild plants we have, in most cases, no positive proof that such races are descended from the parent stock; but we draw that

inference from observing that the differences by which they are distinguished are not greater than what we observe among the descendants of plants submitted to cultivation—with one important difference: that the wild races, having been for a long period subject to the same external conditions, usually show greater constancy in their characters than cultivated varieties, developed under conditions of a less permanent kind.

The varieties enumerated in works of systematic botany are almost invariably races, such as those above referred to, and under this head many botanists are disposed to rank a large portion of the so-called species described of late years by painstaking observers in France and Germany, who start from the assumption that differences which are preserved in cultivation, when a plant is raised from seed, are evidence of specific distinctness.

The great practical difficulty for the systematic botanist arises from the existence of forms more widely different from recognised species than varieties usually are, distinguished by well-marked characters affecting several organs, and occupying a definite geographical area, yet whose distinguishing marks are of such a nature that he is led to the conviction that they have sprung from other more widely diffused species. This conviction may arise either from remarking that the differences affect organs habitually subject to much variation in the same group, or that at some place or places within the area common to both they are connected by intermediate forms, suggesting the probability that the doubtful plant has originated there, but has been able to diffuse itself through a larger area without exhibiting connecting links. It is for such forms as these that the term *subspecies* appears to be desirable in descriptive botany, and has recently been adopted by some eminent authorities. The term has been used by others however, and notably by M. Alphonse De Candolle as above observed, in a different sense, and the adoption of the term in this sense would result in the substitution of subspecies for varieties in ordinary botanical language. The use of the subspecies as a distinct unit in classification in Dr. Boswell-Syme's "English Botany," and its adoption in Dr. Hooker's "Student's Flora of the British Islands," have given the sanction of high authority to the view here advocated; but there are two slight modifications which appear to me desirable, and which I trust may obtain the acquiescence of those entitled to rank as legislators in natural science.

Inasmuch as no plants deserve to be classed as subspecies which do not present obvious differential characters, easily recognisable by the practised eye, and inasmuch as a subspecies should inhabit a definite geographical area, authorising inferences as to conditions of distribution somewhat similar to those derived from facts relating to true species, it seems to me desirable that in systematic works they should be enumerated under a distinct heading, and it would probably answer every useful purpose if, in works of a general character (Floras or Monographs of genera or orders), the subspecies were made to follow the species from which we believe them to be derived, merely being distinguished by a difference of type. Still more desirable, I think, it is that the rules

now generally recognised as to the nomenclature of species should be extended to subspecies. There can be no objection to repeating some descriptive epithet, such as *glabra*, *hirsuta*, and the like, to indicate marked varieties of many different species in the same genus; but a subspecies should be recognised by a distinct name, such as will admit of no confusion with other forms of the same group, and allow us to refer to it without the cumbrous addition of the name of the (assumed) parent species.

Although, as I have already intimated, I do not believe that it will ever be possible to give categorical definitions of the terms *species*, *subspecies*, and *variety*, and still less that a positive test can be devised by which to decide on the rank that should be assigned to a given form, it seems to me probable that we may hereafter approach more nearly to such a result than our present limited knowledge of facts enables us to do. It may, perhaps, be found that the relationship of the forms ranked as distinct *species* is ordinarily that of common descent from an ancestral stock now extinct, while *subspecies* are derived forms, descended from a still existing species, whose differences have become so great and so fixed that they do not readily unite to produce fertile offspring, and *varieties* are separated by less marked and less permanent differences which do not generally afford any check to intercrossing.

To illustrate the views here advocated I will take as an example a widely-diffused and very variable plant, the common *Euphrasia officinalis*. In our islands the forms included under this name differ so slightly that, as I believe, no botanist has proposed to designate them by distinct specific names; but on the continent of Europe, to speak only of the region with which I am somewhat acquainted, we find a large number of such forms presenting wide differences of shape and aspect. The floral organs, indeed, vary little except in size, but the leaves are so dissimilar that if only a few be selected for comparison most botanists would at once refer them to different species. In some forms the leaves have few and blunt teeth, in others these are numerous and sharp, while in a common mountain form (*E. salisburgensis*) the narrow leaves have very few prominent teeth, each prolonged into a setaceous point. Along with these we find differences of habit, and every condition of the surface from quite glabrous to densely pubescent. Many of these forms have been described as distinct species. The careful observer will, however, find that all the differences which mark these so-called species are no more than exaggerations of the slighter variations which the common plant everywhere exhibits, and further, that the groups of forms belonging to one region do not exactly correspond with those inhabiting a different region of the same continent, so that if each of them were described and registered, works of descriptive botany would contain an unmanageable number of plants so closely resembling each other that even close study and observation would scarcely suffice to distinguish them. If it were true, as M. Jordan, the most careful and consistent representative of his own school, contends, that each of these forms is really a permanently distinct organic unit, neither derived from another form nor capable of giving birth to a different one, the student of Nature would have no choice

but to devote himself to the interminable task of observing and registering the minute differences by which they are distinguished. But most botanists who have not confined their observations within a single small region have arrived at an opposite conviction, and, with more or less doubt as to one or two of the more widely divergent forms, they would rank the remainder as undoubted varieties of *E. officinalis*.

There is one among the forms closely allied to our common Euphrasy that shows differences more marked and more constant than the others. This is the *E. minima* of Schleicher, a plant inhabiting the higher regions of the Alps, Pyrenees, and Carpathians, distinguished by its dwarf stature, very small, usually yellow flowers, and shortly oval crenate leaves, much smaller than in any other plant of the same group. The mere fact of the presence of this form on several widely dissevered mountain masses, while it is absent from the intervening low country, is strong evidence of its high antiquity, while a comparison between it and several of the forms that we refer to *E. officinalis* leaves little doubt that it is related to the latter by genetic descent. This I am inclined to cite as a typical instance of a subspecies.

The same group affords another instance, no less useful as an illustration. In the South-Eastern Alps, through the zone of crystalline and dolomitic limestone extending from the district north-east of the Lake of Garda to Carniola and Southern Styria, a plant known as *Euphrasia tricuspidata* is widely spread throughout the warmer valleys. Although the flowers differ from those of *E. officinalis* only by their larger size, the leaves are so peculiar and so constant in form that since the time of Linnæus this has always been admitted as a distinct species. Amongst all the modifications of *E. officinalis* the leaves vary between broadly ovate and narrowly lanceolate—having the broadest part in the lower half of the leaf, and thence tending to a blunt or sharp apex. In *E. tricuspidata* the leaves are strap-shaped, with parallel uncut sides, and have at the summit three short teeth, one in the middle and one at each angle. A further mark of distinction is that *E. tricuspidata* flowers considerably later than any of the neighbouring forms of *E. officinalis*. During many successive years I had traversed the region which is the home of this plant, and had never seen any notable variation in its characters. At length in an unfrequented valley of Friuli I came upon a series of intermediate forms between this and the variety of *E. officinalis* known as *E. salisburgensis*. The first impression was that this was a case of hybridity, but, in the first place, the intermediate plants seemed to have produced seed abundantly, and, further, these forms were not confined to a single spot, but extended at intervals over a space of several miles. I do not pretend that the evidence was conclusive, but the conclusion which I was led to draw was that *E. tricuspidata* had probably originally arisen as an extreme form of *E. salisburgensis* in Western Friuli, and that it was so far adapted to the physical conditions of the surrounding region as to be able to spread and maintain itself for a considerable distance east and west of its original home. If further observation should confirm that made by me several years ago, *E. tricuspidata* should be ranked as a subspecies of *E. officinalis*.

It is scarcely necessary to remark that as regards districts imperfectly explored, such as the range of the Great Atlas, the difficulty of deciding on the rank to be assigned to new forms, differing more or less widely from those already known, is very much greater than it is in a region more fully explored by naturalists. Beyond some general acquaintance with the Mediterranean flora, of which that of Morocco is an outlying division, I can pretend to no special qualification for arriving at correct conclusions. I am aware that many botanists would be disposed to rank as distinct species forms which I have described as varieties or subspecies, while others may regard some subspecies proposed by me as mere varieties.

A fuller acquaintance with the vegetable population of the region which we traversed in haste will be needed to determine how far the rank here conjecturally given to each form is entitled to permanent recognition.

(To be continued.)

SHORT NOTES AND QUERIES.

NOTE ON *PLANERA DAVIDII*.—In an article forwarded to the "Journal of Botany" some time since, and which will, in all likelihood, be in print* before the present note reaches England, I stated that the plant described by me under the name of *Planera Davidii* differs so much from the true species of that genus in carpical structure, that it must form the type of a subgenus—if not rather a genus—for which I proposed the name *Hemiptelea*. I have just received the first part of the ninth volume of the "Mélanges biologiques," extracted from the Bulletin of the Imperial Academy of Sciences at St. Petersburg, and only printed in January of the present year, where I find, from a revision of the East Asiatic *Ulmaceæ*, given by my friend M. Maximowicz, that Dr. Planchon had not only previously recognised the Chinese tree as the type of a genus, but that he had, by a remarkable coincidence, selected the very name I myself subsequently suggested. The latter circumstance is so singular that I think it well, for my own credit, to state explicitly that, at the time of writing, I was totally unaware of M. Planchon's views; and that at present even I have no further knowledge of them than that derived from M. Maximowicz's paper.—H. F. HANCE.

CALAMINTHA SYLVATICA, *Bromf.*, IN HANTS.—Some three or four years ago the late Mr. R. S. Hill, of Basingstoke, showed me a specimen of this plant, which he had received from Mr. H. Reeks, of Thruxton, near Andover. In reply to my enquiries, Mr. Reeks informs me that a few years since the plant occurred abundantly in old neglected shrubberies and on waste ground in the neighbourhood of Thruxton, but that it is almost extinct there now, owing to alterations. He suggests that it may have originally escaped from cultiva-

* See p. 171 of this volume.—(Ed. Journ. Bot.)

tion. I do not, however, think this probable, as the plant is not a likely one to be grown in gardens; and there appears no reason, in the absence of evidence to the contrary, why it should not be considered indigenous in the locality mentioned.—FRED. I. WARNER.

HAMPSHIRE PLANTS.—In company with the Rev. W. W. Spicer and other members of the Winchester and Hampshire Scientific and Literary Society, I paid a visit on the 4th July to Miller's Pond, between Southampton and Netley, and succeeded in collecting, among others, the following more or less rare and interesting plants:—*Spergula arvensis*, var. β *vulgaris*, Syme, E. B. ed. iii., and *Valerianella auricula*, DC., on the railway embankment near Sholing Station; *Pinguicula lusitanica*, Linn., in abundance; *Utricularia intermedia*, Hayne, and *Malaxis paludosa*, Sw., in boggy ground at one end of Miller's Pond; and *Cochlearia anglica*, Linn., *Spartina stricta*, Roth., and *S. alterniflora*, Loisel., on the mud flats at the mouth of the Itchen.—F. I. WARNER.

JUNCUS PYGMÆUS.—I have found this in great abundance during the present year in several parts of Lizard Down, extending over a great many acres. I send specimens.—JAMES CUNNACK.

A NEW SCOTCH SPHAGNUM.—I enclose specimens of *Sphagnum Austini*, Sullivant, which Dr. Lindberg recognised among a collection of Mosses which I made in the Island of Lewis in 1868. I had supposed the plant to be a remarkable variety of *S. cymbifolium*, differing so widely from the typical form of the species as to warrant me in making a diagnosis of its characters. It is geographically interesting to find a species not rare in North America inhabiting the Western Isles of Scotland. It grew on extensive flat boggy moors, and forms large hummocks sometimes 18 inches to 2 feet above the surrounding level.—D. MOORE.—[Grows also in Sweden. The species has been exhaustively illustrated by Dr. Braithwaite in the "Monthly Microscopical Journal" for May last, tab. 17.—*Ed. Journ. Bot.*]

ANTHOCEROS LÆVIS IN IRELAND.—During a visit in July to the south-west of Ireland with Dr. Lindberg, we found this rare species, not before known to grow in Ireland, in one place only near Ventry, Co. Kerry.—D. MOORE.

ECHINOSPERMUM LAPPULA.—I found a specimen of this plant last month near the Horton railway-station, near Northampton. I had not time to examine the locality carefully, but did not see more than one example, which I have placed in the herbarium of the British Museum. Near it was *Silene noctiflora*, which I did not observe elsewhere in the neighbourhood.—JAMES BRITTEN.

HYPERICUM DUBIUM IN CAMBRIDGESHIRE.—I enclose specimens of *Hypericum dubium* collected at Kirtling, near Newmarket, Cambridgeshire. It has not, I believe, been before recorded for this county, and is unmentioned in Professor Babington's Flora.—R. A. PRYOR.

Extracts and Abstracts.

ON THE STRUCTURE OF THE BEET-ROOT.

BY T. LESTIBOUDOIS.

THE root of *Beta vulgaris*, on account of its importance in agricultural and industrial economy, has often been studied. Its structure, however, never seems to have been properly understood.

The part which bears the so-called *radical* leaves, the "neck," although short, is a true stem, and terminates in a bud which does not usually elongate except during the second year of growth. If a vertical section is made through this abbreviated stem, it is seen to contain a medullary centre, which is large but irregular, because it is bounded by fibres which curve to form the closely approximate leaves. Below the insertion of the cotyledons the medullary centre diminishes and speedily disappears altogether, because the bundles contract irregular fibrous unions and finally consolidate into a central axis. Outside the central axis are fibro-vascular bundles separated by medullary spaces, which are narrower as they are more external; their thickness also diminishes from above downwards. The longitudinal bundles furnish transverse fibres to the rootlets, which originate primarily as small tubercular buds. Some of the fibres merely take a curve without actually leaving the bundles. Beyond the most external bundles there is nothing but a zone of tissue which is entirely cellular. Such are the parts which are met with in a longitudinal section of a fully-grown Beet. A transverse section makes their relative dispositions apparent. If it is made immediately below the leaves, it shows the enlarged central medulla; lower down, the medulla contracted by the fibres which pass from one bundle to another; lower down still, the fibres which occupy the centre and obliterate the medulla by their fusion.

Sometimes, however, the medullary spaces which separate the two primitive bundles, and which correspond to the cotyledons and to the depressions in which the numerous rootlets originate, persist; and the centre of the root remains medullary even to its base.

Round the central bundle is a pale zone becoming more coloured and more areolar on its outer side. Externally to this are circles of bundles separated from one another by medullary zones. These bundles are composed of an internal or woody portion formed of opaque vessels surrounded with slightly transparent fibrous tissue, and of an external transparent portion sometimes separated from the woody portion by a less consistent trace of tissue; it represents, therefore, the cortical element. Between the bundles are rays or medullary prolongations, distinguished by their colour and their want of transparence, extending from one medullary zone to another, or appearing to be interrupted, because they are transparent

in the region where the external portion of the bundles is united with the woody portion. The fibro-vascular bundles are smaller and smaller the more exterior they are; at the periphery they are scarcely more than a barely perceptible vascular point; they may even be destitute of vessels, and form by their union only very restricted traces of vascular tissue. The medullary zones are also narrower and narrower as they are more external. Outside the last transparent trace nothing is met with but a uniform succulent zone, in which one meets with neither fibrous bundles, nor distinct layers, nor medullary prolongations. In short, it contains none of the elements of a true cortex.

These details recall the arrangements which are met with in Dicotyledons which are termed heterogeneous (for example, some species of *Bauhinia*, *Menispermum*, *Glycine*, *Gnetum*, *Zamia*, *Cycas*, *Avicennia*, the roots of *Cainça*, of some *Convolvulaceæ*, &c.)—that is to say, of plants which, instead of possessing a single zone of growth in which ligneous and cortical elements develop themselves, form new bundles in the midst of the parenchyma of the cortex, so that their axis consists of concentric formations which are separated by a medullary zone, and each preserve their own cortical element and special growth; consequently there is no external system uniting all the cortical elements, but only a zone uniformly cellular.

If the development of the Beet is followed, it is seen that the new bundles make their appearance in the parenchyma external to the old ones; that the different circles of bundles are separated from those preceding by a medullary layer; that they preserve their proper cortical element; and that they continue to increase, so that the internal or the most ancient bundles have the vascular element most developed; finally, on the exterior of the bundles there is merely a simple parenchymatous zone.

If a vertical section is made through the young plant, the vascular bundles are seen to be separate beneath the cotyledons; then they approach so insensibly that it is difficult to say where the medullary centre terminates; a centimetre below the cotyledons the bundles are fused at the centre. A transverse section made at this point exhibits a central bundle incompletely divided into two parts; at the higher level the two bundles are distinct, and beneath the cotyledons there are four bundles, two being formed between the two primary ones for the formation of the cotyledonary expansions. The vascular bundles are surrounded by a white transparent zone; externally is a parenchyma composed of two zones: the inner is dense, succulent, red, pink, or white, according to the varieties; it has its inner circle obscure; the outer circle is lax, composed of large empty cells, tinged with pink towards the epidermis.

The transverse section of a young plant which has two leaves more than the preceding exhibits the appearance of a trace of transparent tissue in the inner zone of the cortical parenchyma. By successive developments this trace enlarges, and finishes by forming a complete circle, which separates the most internal portion of the cortical zone from the rest, and which soon produces vessels. This new formation is composed, then, of a vascular cylinder, and of a transparent zone

placed externally; it is separated from the central formation by a coloured or "obscure" medullary zone, which was the inner circle of the cortical parenchyma; outside the central formation there are two zones of cortical parenchyma.

In examining a young plant which had four leaves more than the preceding, we found the hypocotyledonary axis destitute of the external zone of cortical parenchyma, and only preserving shreds of it adherent to the neck. Its transverse section shows that in the persistent cortical zone a new transparent circle made its appearance, provided with scarcely visible vascular elements, and separated from the second formation by a coloured zone (red var.) which formed originally the inner circle of cortical parenchyma.

In young plants which have the leaves still more numerous, there are medullary prolongations which divide the transparent zone of each formation into bundles corresponding with the woody bundles; new formations appear in the external parenchyma, and the older ones take a more considerable development.

Lastly, in a Beet arrived at the termination of its year's growth, we reckoned seven circular formations besides the central. The bundles of this last, separate at a little distance from the leaves, united in their lower portion, are elongated from within outwards, divided by medullary rays which penetrate irregularly into their thickness, and which are sometimes coloured, and preserve some bundles separate from the rest. These bundles are surrounded by a zone entirely white (white var.), or red in its external half (red var.). Round the central formation are circles of bundles formed successively, and separated the one from the other by medullary zones becoming narrower and narrower towards the periphery. Between these bundles are rays or medullary prolongations more apparent in the older portions, contracted in their middle part because the bundles are enlarged, appearing sometimes interrupted because this middle part remains transparent.

Each bundle is composed of an inner or woody portion formed of a vascular group bordered internally by transparent tissue, orange (red var.) or white (white var.), and of an external or cortical portion, which is marked out from the medullary prolongations or rays by the transparency of its boundaries. It may also be distinguished by its colour; sometimes it is orange, when the medullary zone is of an intense red.

The part of this tissue nearest the vascular group is often more transparent than the rest, and when the rays are interrupted it seems to unite with that of neighbouring bundles so as to indicate a circle of continuous increase. The tissue which is developed near the vascular group takes sometimes another tint, that of rose for example, so that the external portion of transparent tissue seems separated from the inner. Sometimes this coloured portion occupies only the centre of the inner border of the transparent tissue; then the border is a little crescent-shaped, as in many of the cortical bundles.

The cortical and ligneous parts of the bundles are more enlarged in the direction of the diameter of the root and more divided in

proportion as they are older. Thus the vascular groups of the first circular formation, which originally were only rounded points, are greatly enlarged subsequently, and are bi-tri-furcate. In the outer circles the vascular groups are in simple series less and less developed; in the antepenultimate circle the vessels only form a rounded group; in the penultimate they are only an obscure point, and the bundles are so approximated that they seem united, but from space to space there are rays of considerable size, extending from the external medullary circumference to the internal. In the last circle the bundles are very small, very approximate, almost united; some have a vascular point apparent, others are destitute even of this. The last circle is frequently interrupted; sometimes the portions which compose it are attached by an extremity to the inner transparent circle; sometimes they are only traces of extreme tenuity appearing in the cortical zone. This remains narrow and homogeneous, and has not the appearance of a complete cortex.

The Beet which developes during the second year (June), and of which the stems elongate to become seminiferous, has a structure similar to what has been described; the vascular formations are merely more numerous—on the fragment which we examined we counted ten vascular formations. Those which are the most external have the same characters as those which occupied the periphery previously, and these last have acquired their development.

The microscopical examination of the different parts which compose the Beet fully justify the terms which we have employed. The medulla which exists in the upper part of the hypocotyledonary stem is formed of cells at first transparent, then areolated, dilated, disposed without order. The woody bundles are formed of large vessels, flexuous, with spiral fibres more or less anastomosing, united by vascular or by fibrous tissue, white, sometimes a little orange (red var.), slightly transparent, composed of elongated cells, rounded or quadrangular, narrow, with rounded, slightly acute extremities, united end to end, or placed in the interval between two cells with very delicate walls, scarcely apparent in a longitudinal section, often covered with very finely granular matter. The medullary rays are formed of cells disposed in transverse rows; they are cubical, sometimes a little higher than wide, rarely a little elongated transversely; their walls are opaque. The transparent parts, which represent the cortical bundles, and are placed externally and opposite the woody bundles, are formed of elongated cells like those of fibrous tissue; but these cells enlarge towards the exterior, and become more dilated as they are nearer the medullary zone. Long tubes, attenuated at the extremities, are not met with in these transparent bundles as in some cortical fibres; but many fleshy roots have the cortical bundles formed of rather short cells rounded at the extremities. We have seen also that the cells of the fibrous tissue of the woody bundles do not take the form of tubes or of clusters. The medullary prolongations which separate the cortical parts of the bundles are formed of cells, similar to those of the medullary rays opposite which they are placed and with which they are blended. The medullary zones which separate the circular formations which succeed are formed of

opaque cells, rounded, dilated, distributed without order, red, pink, or white according to the varieties.

The cortical zone, in which the vascular circles develop successively, is homogeneous, rather dense, succulent, becoming pale in the interior in the coloured varieties, opaque in the white variety. It is composed of elongated cells, often with four angles, with rounded extremities united end to end; their walls are thick, obscure at the lines of union, covered with a granular matter exhibiting a nucleus in a transverse section.

The transparent traces which occur in the cortical zone not far from its inner border, and in which the vessels would be developed, are formed of elongated cells a little rounded at the extremities, with very thin partitions covered with a mucilaginous substance, having in the centre a very small cavity filled with more opaque matter, which in the transverse section represents a scarcely visible nucleus; in a word, the cells are similar to those of the fibrous tissue of the woody bundles, and of those of the cortical bundle of which it is the origin. The zone of coloured or opaque tissue, which is separated from the cortical zone by the transparent tissue which occurs in this last, has the same organisation as the cortical zone itself: but its cells enlarge (*se dilatent*) by the development of the medullary zone of which it is the commencement. The external zone of cortical parenchyma, which is quite transitory, is formed of large cells, dilated, sometimes provided with a granular nucleus confusedly distributed, red or uncoloured, separated by lacunæ. The epidermis is formed of delicate cells flattened, quadrangular, or hexagonal, coloured or uncoloured.

Thus the opinion which we have stated as to the nature of each of the parts of the Beet is confirmed by their anatomical constitution, and one may consider as conformable to the facts the manner in which we have regarded the general structure of the roots of this plant. It produces in a continuous manner new fibro-vascular bundles in the cortical parenchyma outside the *interstice d'accroissement*; the external zone is uniformly cellular and does not contain the elements of a complete cortex. The new bundles surround the old ones, and are separated from them by the part of the cortical parenchyma placed within the new formation. All the old bundles preserve their cortical element and increase in size after they are enclosed by the external bundles. The circular formations acquire thus a size which is greater as they are more interior, and all contain "recent" tissue; it is without doubt due to this circumstance that the root contains so large a proportion of sugar and is difficult to preserve. All the characters which we have described are those which distinguish the "heterogens"; one difference only exists between the Beet and the heterogens best known—it is that they are woody and have a prolonged existence, while the Beet is biennial.

The Beet is distinguished at first sight from fleshy roots which, like the Carrot, have a bark separated from the central system by a cambium, and formed of large parenchyma, of very distinct medullary prolongations, and of transparent bundles of large diametral

dimensions. But all fleshy roots have not a cortex so characterised. In the Radish (red var.), for example, it is thin, and its bundles are scarcely apparent ; it remains altogether separated from the central system by a cambium, well marked when the vegetation is active, and when it is separated it is seen to have bundles not well limited, but still distinct. Besides the woody bundles do not increase after they are surrounded by more recent tissues. In the black variety of the Radish the woody fibres, disposed in circles sufficiently regular, imitate the circular formations of the Beet, but it has a bark of which the bundles are perfectly distinct when a fresh root is examined ; they correspond to the woody bundles, and all their divisions correspond exactly to the divisions of these. The internal vascular groups are not accompanied by a cortical element, and there is no other increase than that which takes place in the single zone of increase placed between the two systems.

In the variety of the Beet called Bette or Poirée, of which the root is only some centimetres in diameter, it is difficult though possible to recognise the organisation which has been described.

The structure which is observed in the hypocotyledonary caudex of Beet does not continue at least exactly in its hypocotyledonary stem. When in the second year, or by precocious development in the first, it "bolts," it constitutes a strong branching stem provided with five projecting *côtes* with a very large medulla, white, areolar, and a little fistular at the centre, succulent, green, and tending to pink in its external portion. Its woody system is composed of five isolated bundles corresponding to the deep sinuses which separate the angles of the stem, and more externally of a circle of woody bundles, compact, narrow, greenish, or slightly pink. In some points this circle is interrupted ; it is separated from the cortex by an incompletely transparent and badly defined zone enlarged at some points. These enlarged parts are sometimes divided by series of small woody bundles arranged in lines, holding by one extremity to the principal ligneous circle, or entirely separated, and seeming to indicate a commencement of the heterogenous increase observed in the root.—[Translated from the "*Comptes Rendus*," 1871, pp. 307—314.]

Notices of Books.

Internationales Wörterbuch der Pflanzennamen in Lateinischer, Deutscher, Englischer, und Französischer Sprache. Von Dr. WILHELM ULRICH. Leipzig: 1872. (Pp. 342.)

Catalogo Poliglotta delle Piante ; compilato dalla CONTESSA DI SAN GIORGIO. Firenze: 1870. (Pp. 747.)

Deutsche Pflanzennamen. Von HERMANN GRASSMANN. Stettin: 1870. (Pp. 288.)

A good polyglot dictionary of plant-names has long been a desideratum, and although many works have been put forward in the attempt to supply it, such a book is still a thing of the future. As long ago as 1682, Mentzelius published a folio "*Index nominum plantarum universalis*," which is pretty satisfactory as far as it goes, though of comparatively little practical use on account of its ante-Linnean nomenclature. So far as I know, Nemnich's "*Allgemeines Polyglotten-Lexicon der Natur-Geschichte*" is still the most comprehensive dictionary of the kind which we possess, although published as long ago as 1793; and this notwithstanding the appearance of numerous others of more recent date, three of which are named above.

It is, however, somewhat remarkable that at least three botanists of note have at different times occupied themselves in collecting plant-names, and that the results of their labours in each case remain unpublished. Gaertner, during his residence at St. Petersburg, compiled a dictionary of them, of which we have been unable to discover any details. A "*Dictionnaire des Noms vulgaires des Plantes*," compiled by Moritz, with the assistance and under the direction of the elder De Candolle, is in the library of the De Candolles at Geneva, and is probably the most complete in existence so far as arrangement and convenience of reference are concerned. This was arranged for publication, and a prospectus and specimen of the work were issued.* Unfortunately its magnitude, embracing as it did "the names of plants in sixty different languages or dialects, from French, English, and other European languages, to Chinese, Sanskrit, Mexican, &c.,"† prevented the publishers to whom it was offered from undertaking its production. Something of its value and completeness may be gathered from the description given of it in the memoir already cited:—"It is an immense work, executed with great care, and of which the publication would have an interest at once botanical, philological, and geographical. Botanists would avail themselves of it in utilising the descriptions of travellers. Philologists would delight to trace the origin and filiation of the names of plants from one language to another. Readers of travels, agriculturists, traders who receive the products of foreign countries, would find here the explanation of many of the names which puzzle them." This "*Dictionnaire*" is frequently quoted in De Candolle's "*Geographie Botanique*." Lastly, the late Dr. Seemann had, as is well known, devoted much time and care to the collection of these vernacular names. He entertained strong views as to their importance,‡ and from his extensive philological knowledge was admirably fitted to carry out the task which he unfortunately did not live to complete. It is to be hoped that his large MS collection will be acquired by some scientific establishment where it will be available to future workers in the same field.

It is no disparagement to Dr. Ulrich's work to say that he does not attempt anything so extensive as the collections of Moritz or

* See Pritzel, "*Thesaurus Botanicum*," p. 202, No. 7204.

† Alph. De Candolle, "*Biographie de M. Moritzi*," *Arch. des Sciences Physiques and Naturelles de Genève*, xv., p. 6.

‡ See *Journ. Bot.* vii., 333—336.

Seemann. It is intended "for botanists, and especially horticulturists, agriculturists, students of forestry, and pharmacutists," and thus takes in only the names by which trees or plants are known in horticulture or agriculture in Latin, English, German, and French. Even this, if well done, would have been very useful, especially to gardeners; but we find many omissions. Thus in the English index we look in vain for such well-known names as Aaron's-beard, Abele, Aconite, Alkanet, and Allgood; while we are surprised to find Abelia, Acæna, Acetabularia, Acanthophippium, Acanthospermum, and a host of similar titles, given as English names. The French index seems rather better; but we miss Absinthe, Aigle-impérial (*Pteris aquilina*), Aigrelie (*Pyrus torminalis*), Aiguille de Berger (*Scandix Pecten*), all common enough in French books: while the names which we have already cited as English appear in a gallicised form as Abélie, Acéna, Acétabulaire, Acanthophippie, and Acanthospermum. In the list of German names the book seems pretty complete, and in this respect it may be useful.

But the notion that every plant must have a name in every language, which has introduced so many absurdities to our Floras as "English names" (such as "Reichenbach's Yellow Rocket" for *Barbarea arcuata*, "Small Jagged Water-Radish" for *Nasturtium palustre*, "Twisted-podded Whitlow-grass" for *Draba incana*, all given in Syme's "English Botany"), has led Dr. Ulrich to adapt or translate the Latin names so as to suit each language. Thus *Callistachys* is the same in English, "die Callistachys" in German, and "la Callistachide" in French; and this in spite of the prefatory announcement that "plants which keep the Latin expression in all other languages are not mentioned here." Such pseudo-popular names are of no value whatever, and their insertion is merely a waste of space. Some of the English names, too, are most puzzling: thus on the first two or three pages we have Deadly Wale for *Acnistus arborescens*, Marshy Milfoil for *Achillea Ptarmica*, Inglorious for *Adoxa*, Lady-root for *Adenantha paronina*, and so on. *Aconitum Napellus* has one of the English titles of *Arum* bestowed upon it; while *Arum* itself, which has many French names, is only represented in that language by *l'Arum maculé*. Nor is the Latin synonymy always satisfactory; e.g., *Achillea millefolium* is not synonymous with *Ptarmica vulgaris*.

Dr. Ulrich's "Wörterbuch" is on the whole tolerably free from misprints; but this is more than can be said for the second work on our list. Some of these typographical errors are very puzzling: thus *Medicago arborea* is anglicised as "Tree Montrefoil of Virgil"; *M. echinus* is the "Sea Egg-Medick Plant"; *M. scutellata* is the "Swain [snail] shell." In some respects, however, the "Catalogo Poliglotta" is more satisfactory than the "Wörterbuch": the native country of each plant is indicated; Italian, Spanish, Indian, and American synonyms, besides French, German, and English, are cited; and names adapted from the Latin, after the plan familiar to those acquainted with Mr. Bentham's "Handbook of the British Flora," are not very frequent. Some of the so-called "English names" have, however, small claim to that title: such as "Barton's flower, golden yellow," for *Bartonia aurea*; "Bugloss officinalis," for *Anchusa officinalis*; "Man's beard-

grass, woolly," for *Andropogon Ischæmum*; and so on. Much of the unsatisfactoriness of this and the preceding work is to be attributed to the fact that the authors have in neither case consulted the books most suitable for their purpose. Dr. Prior's "Popular Names of British Plants," for example, which is our chief authority for English names, is not cited by either; the English works referred to in the "Catalogo" including such as Johnson's "Chemistry of Common Life" (!), Archer's "Economic Botany," &c. It would have been more to the purpose had Nemnich's Lexicon been cited; and Lindley and Moore's "Treasury of Botany," which is singularly good in English and French vernacular names, should not have been overlooked.

Prof. Grassmann's "Pflanzennamen" well exemplifies the uselessness of manufactured names. The German name of some one species is applied to the genus, and all the other species are made to conform to it. Thus *Cytisus Laburnum* is known in German as Gold-regen: regen is taken for the genus, and adapted to the various species, thus:—*C. alpinus*, Alpen-regen; *C. argenteus*, Silber-regen; *C. capitatus*, Kopf-regen; and so on. By this means the idea of rain, which is not inappropriate when applied to the Laburnum (which the Swedish call Guld-regn and the French Pluie d'or), loses all its significance, and in the case of *C. capitatus* is singularly inappropriate. The notes prefixed to each genus are, however, extremely good, as are also the references to other authors, such as Grimm and Diefenbach. The Scandinavian names, too, which are omitted from the two works already noticed, are from time to time cited. We note that Prof. Grassmann follows the natural system in the arrangement of his plants; Ulrich and the Contessa di San Giorgio prefer the alphabetical, which is certainly more convenient for ready reference, and their indices are more copious. Each of the three will, however, doubtless be of service to the future author of a comprehensive polyglot dictionary of plant-names.

JAMES BRITTEN.

The Art of Botanical Drawing. By F. W. BURBIDGE. With Twenty Engravings designed by the Author. London: Winsor and Newton. 1873 (8vo, 63 pages).

THE young botanical artist will find this little book of considerable service to him, particularly as it is the only treatise of the kind in print, if we except a series of papers in the "Gardener's Chronicle" by Mr. Fitch, and a few remarks by Schleiden in "The Plant."

The ordinary artist is too apt to overlook the fact that the beauty of the drawing must be secondary to its botanical correctness, and that the flower must be so placed as best to show its botanical peculiarities, not its most graceful contour; also that softness must often give way to distinctness, or what might be called hardness.

This book contains, first, an elementary chapter on drawing materials; secondly, a chapter which the student will find practically very useful on the drawing of leaves; then come two on regular and irregular flowers, followed by one on the drawing of fruits and seeds, all copiously illustrated. Two pages are devoted to microscopic

drawing, which forms no unimportant part of the work of a botanical artist.

Some useful hints are contained in the concluding chapters, but we do not understand why we are to wait till the paper is "quite dry" before laying on the colours. We imagined the purpose of wetting it was that, after being pressed by the blotting-sheet, it might retain some moisture which would soften the edges and assist in blending the colours; and if our memory is right, Ruskin, in place of our author's "well-filled brush," advises "very little colour in the brush" to the young painter.

H. B.

Proceedings of Societies.

LINNEAN SOCIETY.—*June 19th.*—Mr. D. Hanbury exhibited a living plant in fruit of *Amomum Melaueta*, "Grains of Paradise" plant, raised in his hothouse.—Mr. Joad sent for exhibition a specimen of *Medicago tribuloides* collected in Algeria, remarkable for the alteration effected in its legumes by the attacks of a *Ustilago*. The affected pods, instead of presenting the usual spiny and many-turned spirals, were much reduced in size, and possessed but a single turn, having the appearance of those of *M. obscura* or *M. elegans*.—"On the Development of the Gynœcium and the Method of Impregnation in *Primula vulgaris*." By Dr. Martin Duncan. The author found reason to entirely dissent from the observations detailed by Duchartre on the development of the pistil in *P. veris*, and by Payen. He believed that the former had before him a monstrosity. The ovarian wall does not grow up over the free placenta (or, as the author prefers to call it, the stroma), as has been described, but the two are in organic connection at the base; the stroma never has any other connection with the ovarian walls or with the style or stigma, but terminates in a point at the top just beneath the funnel-shaped arched dome of the interior of the ovary, which is lined by a layer of dense cells. The style is not hollow but solid. The ovules originate from the stroma, and are exceedingly simple, consisting merely of an external coat and the embryo-sac; the micropyle is placed close to the hilum, and so is in close proximity to the stroma. Running up the centre of the stroma is a vascular column from which radiates numerous branches in all directions. The course of the pollen-tubes was described in detail. They push their way through the conducting tissue of the style, and are then directed by the layer of dense cells lining the ovary down the ovarian walls to their base; here longitudinal dissepiments prevent their lateral passage, and they are compelled to pass into the stroma and pass upwards; in so doing they must at last impinge upon one of the branching vessels, by which they are directed outwards and reach the micropyle of the ovule. The changes in the ovule after impregnation were minutely described up to the formation of the embryo and

endosperm. The whole ovule rapidly enlarges; some of the floating granules arrange themselves into elongated masses, others into globular masses, which acquire delicate cell-walls and become the endosperm, the elongated masses forming the commencement of the embryo.—An interesting discussion ensued. Dr. Cobbold gave some details of his own examination of the fecundation of the ovules in *Datura* (*Brugmansia*), where the ovules, also anatropal, are on stalks, and the micropyle at a little distance from the surface of the placenta; he believed that he had seen pollen-tubes passing out from the placenta to reach the micropyle. Dr. Hooker called attention to the mode of origin of the ovarian walls and stroma as given in the paper, which indicated that they were developments of the disk. Prof. Dyer pointed out the strongly-marked axial characters of such a placenta, and made some remarks on the anomalous nature of the origin of the ovules as described by Dr. Duncan, which drew from the latter some further details.—“On the Plants of Kilima-njaro.” By Dr. Hooker. This mountain-peak lies close to the Equator, in lat. $3^{\circ} 5'$ S., in Zanzibar, E. Africa, and reaches over 20,000 feet in height; the snow limit is about 16,400 feet. Seven regions of vegetation may be distinguished, a lowest cultivated district, then a belt of scrub, followed by a forest region, a district of pasture-land, a heathy zone, and lastly a region of bare rocks up to the snow-line. The plants, about fifty in number, were collected by Mr. New, a missionary.* The S. African character of the flora is very remarkable, and although twenty species were collected just below the snow-line, there are no alpine forms. *Adenocarpus Mannii*, also collected in the Cameroons, on the west coast, belongs to a Mediterranean genus.

BOTANICAL SOCIETY OF EDINBURGH. — *June 12th.* — “Notice of Botanical Excursions made in 1872 and 1873 (No. 2).” By Prof. Balfour.—“On the Re-tubbing of Palms and other large exotics in the Royal Botanic Garden.” By Mr. McNab.—Mr. John Sadler exhibited a growing plant of *Acer pseudo-platanus*, on which he had made an experiment as to the healing of a wound. In March, 1871, a ring of bark, more than 1 inch in breadth, was removed from the main stem, and the wood underneath rubbed perfectly dry. In a few weeks a swelling was visible on both the upper and under edges of the cut, being the development of woody matter to heal the wound. The swelling on the upper edge seemed to be formed of a ring of adventitious roots, while from the under edge a circle of buds was developed.—Mr. McNab exhibited some specimens of the Irish Yew, with large tuberos swellings of wood formed between the stem and the proper roots. These tubers measured 8 to 12 inches in circumference, and the plants possessing them, though healthy-looking, were smaller in size than those of similar age which had no such growths. The plants had been sent by Mr. Anderson, of the Perth Nurseries.

* These have been already, so far as could then be done, noticed in this Journal (vol. x., p. 285).

Botanical News.

ARTICLES IN JOURNALS.

Journ. R. Horticultural Soc. (June 16th).—J. Boswell-Syme, "On Fertilisation of Grasses" (see *Journ. Bot.* 1872, p. 153).—W. Thiselton Dyer, "On Recent Progress in the Scientific Aspects of Horticulture."—*Ib.*, Abstract of Translation of Boussingault on Honeydew.—J. Denny, "The Relative Influence of Parentage in Flowering Plants."—A. W. Bennett, "Do Flies eat Pollen?"—J. G. Baker, "On *Dracæna* and *Cordyline*."—*Ib.*, "Classified Synonymic List of all known Lilies."—T. Moore, "On *Pteris serrulato-tremula*" (with plate).

JULY.

Grevillea.—E. M. Holmes, "New British Algæ" (*Calithamnion hormocarpum* (tab. 11), *Nitophyllum thysanorrhizans* (tab. 12).)—M. J. Berkeley, "Notices of N. American Fungi" (contd.).—J. M. Crombie, "Note on *Lecanora Ralfsii*, Salwey."

Quart. Journ. Microsc. Science.—W. Archer, "A Resumé of Recent Views respecting the Nature of Lichens" (tab. 9 & 10).—G. Gulliver, "On the Crystals in the Testa of the Elm; on the Character of the Epidermis in the Twayblade."

Monthly Microscopical Journ.—F. Kitton, "Remarks on *Aulacodiscus formosus*, *Omphalopelta versicolor*, with Description of a New Species of *Navicula*" (*N. Perryana* from Callas).—R. Braithwaite, "On *Sphagnum Angströmii*, C. Hartm." (tab. 22).

Oesterr. Bot. Zeitschr.—V. de Janka, "Plant. nov. Turcic. breviarium" (contd.).—*Alcea pontica*, *Lotus albus*, *Ferulago athoa*, *Peucedanum macedonicum*, *Seseli filifolium*, *Achillæa depressa*, *Primula frondosa* (= *P. farinosa*, Griseb. non L.).—A. Kerner, "Distribution of Hungarian Plants" (contd.).—A. Rehmann, "Diagnoses of *Hieracia* in Galicia and Bukowina." (contd.).—M. von Tommasini, "Flora of S. Istria" (contd.).

Bot. Zeitung.—G. Kraus, "Remarks on summer withering of Leaves of Trees" (contd.).—Kurz, "On the *Florideæ*; on the Leaves of *Coniferæ*."—G. Winter, "Remarks on the Genus *Sordaria*."

Flora.—W. Nylander, "Addenda nova ad Lichenographiam Europæam" (31 new species, 15 from Britain and Channel Islands).—Van Gorkum, "Culture of Quinine in Java" (contd.).—H. de Vries, "The Vitalistic Theory and Transversal Geotropism."—C. Kraus, "On the Cause of Colouration of the Epidermis of the Vegetative Organs of Plants."—J. Sachs, "On the Growth and Geotropism of erect stems."—O. Brefeld, "Notes on *Penicillium crustaceum* (glau-cum)."

Bull. Bot. Soc. Belg. (12 July).—C. Bamps, "Rare Plants of the Environs of Hasselt."—A. Thielens, "The Orchids of Belgium and Luxembourg."

Bull. Bot. Soc. France (tom. xix., pt. 4).—E. Fournier, "Sertum Nicaraguense" (Lévy's collection; Ferns; nine new species).—A. Chatin, "*Ilysanthes gratioloides* in Environs of Angers."—Gaudefroy and Mouillefarine, "The 'Florula obsidionalis' of Paris in 1872" (see previous list in *Journ. Bot.*, 1872, p. 339: 72 additional species, 56 no longer found).—Triana, "On *Ræzlia granadensis*, Rgl."—E. Prillieux, "On Formation of 'Bourrelets' on the margin of cuts in stem of *Wigandia caracasana*."—C. Roumeguère, "On a Monstrosity of *Agaricus (Pleurotus) conchatus*, Bull."—M. Cornu, "Note on a Fungus parasitic on an Insect."—P. Duchartre, "Observations on Anatomical Characters of *Zostera* and *Cymodocea*, with reference to a plant found at Montpellier" (*C. æquorea*, Kön.).—Triana, "Sertum Nicaraguense" (*Melastomaceæ*).—B. Balansa, "Ascent of Mt. Humboldt ('Cando' of the New Caledonians)."—Ib., "Catalogue of *Gramineæ* of N. Caledonia" (*Greslania*, n. gen. 3 spp. Eleven new species).—E. Mer, "On origin and development of dormant buds in Woody Dicotyledons."—J. Duval-Jouve, "Synonymy of certain *Cyperaceæ*."

Nuovo Giorn. Bot. Italiano (24 July).—N. Terraciano, "Enumeratio Plant. in agro Murensi sponte nasc." (contd.).—A. Todaro, "Adon Flora of the Balkan."—T. Caruel, "On *Thelygonum Cynocrambe*" notationes ad indicem seminum hort. Panormitani."—V. Cesati, "Notes (tab. 1).—G. Archangeli, "On the regular forms of Vegetable Cells."—Tchistiakoff, "Notes on development of sporangia and Spores in *Isoetes Durieui*, Bory."—Ib., "Note on Cell-Division in Algæ" (tab. 2).—V. Cesati, "Further Notes explanatory of the 'Comp. Fl. Italiana.'"—"Review of Botanical Work at Congresses of Italian Naturalists" (contd.).

A very interesting resumé of the present position of the Lichen-gonidia question, with a translation of Schuendener's last paper on the subject, is contained in the July number of the "Quarterly Journal of Microscopical Science." The botanical side of this periodical has been greatly strengthened by the addition to the editorial staff of Prof. Thiselton-Dyer. The short abstracts of recent foreign memoirs on various points in microscopical botany are a useful feature.

The Transactions of the Norfolk and Norwich Naturalists' Society for 1872-73 contains a full list of all the Fungi at present known to inhabit the country, compiled by Mr. C. B. Plowright. It contains upwards of 800 species, and appears to be a very carefully-prepared contribution to local botany.

In the Annual Report for 1872-3 of the Glasgow Society of Field Naturalists we find a list of additions to the flora of the neighbourhood, and a record of the exotics found on the rubbish heaps about the city. Dr. J. Stirton, the President, contributes a paper on some New Zealand Lichens, sent by Mr. J. Buchanan, of Wellington, in which

eighteen new species are described. He also defines a new species of *Lecidea*—*L. didymospora*—collected on Ben Lawers in 1871.

Dr. Moore, of Glasnevin, has published in the "Proceedings of the Royal Irish Academy" (vol. i., series 2, Science), a complete diagnostic catalogue of all the Mosses known to inhabit Ireland. The total number of species is 378, of which 37 are additional to those previously published. We shall take an early opportunity of giving a fuller account of this synopsis, which occupies 146 pages and gives a full list of synonyms and localities for each species.

The East-Bourne (Sussex) Natural History Society has issued a new edition of its list of the natural history of the district, corrected to June, 1873. The catalogue includes all departments of Nature, and is evidently compiled with unusual care and accuracy. "The flora of the district, from the variety of soil and elevation, is peculiarly interesting, and the present list of 631 flowering plants and Ferns, though by no means complete, embraces three-fifths of the entire recorded flora of Sussex. . . . With respect to the Cryptogamia, the list is more incomplete; but the list of Lichens and Fungi has been more than doubled since 1871, whilst several interesting additions have been made to the catalogue of marine Algæ, and by the kind assistance of Dr. Capron the list of Mosses has been much increased."

Monsieur Pierre de Tchihatchef, the author of the well-known work on Asia, has undertaken a French translation of Grisebach's new Handbook of Geographical Botany. The first volume will appear in Paris in the spring of 1875, or perhaps earlier, under the title of "La végétation du globe, d'après sa disposition suivant les Climats; ébauche d'une Géographie Comparée des Plantes: par A. Grisebach, traduit de l'Allemand et annoté par P. de Tchihatchef." The annotations are expected to be copious, and the manuscript will pass under the revision of Dr. Grisebach himself.

The death is announced at Vienna, on July 1st, of Dr. Franz Pokorny at sixty-four years of age. He occupied a high legal position in the capital, but was an enthusiastic student of Austrian botany.

Dr. Beccari, the Italian traveller and collector, when last heard from was at the Island of Wokam, off the south-west coast of New Guinea; he was to go on to Amboina, and had made large collections of plants and animals.

The prizemen in Botany for this year at the annual competition at Apothecaries' Hall are first Mr. J. Todd, University College, a gold medal; second, Mr. C. H. Cuming, University College, a silver medal and books.

The British Herbarium of the British Museum has lately been increased by the addition of Dr. Trimen's collection, chiefly consisting of the plants of the neighbourhood of London.

Original Articles.

ON AN UNDESCRIBED SPECIES OF MESEMBRYANTHEMUM FROM THE SOUTH OF PORTUGAL.

BY THE LATE FRIEDRICH WELWITSCH, M.D., F.L.S.

(TAB. 136.)

[THE following short paper, left in my hands by its lamented author, was intended by him to have formed the introduction to a more extensive article comprehending general observations on the flora of Algarvia. Dr. Welwitsch had been struck with some remarkable instances of connection between the vegetation of the southern province of Portugal and the Cape of Good Hope, and had selected the plant forming the subject of this article as the most striking example. Unfortunately the notes relating to the general subject are fragmentary and unconnected, and not such as could be got into form for publication by anyone but their writer; the paper, however, here printed, with this explanatory note, is complete as it stands.—*Ed. Journ. Bot.*]

It was in the year 1847 that I commenced a botanical exploration along the coast of Algarvia, the most southern province of Portugal. Besides many rare and several new European species, I collected a shrubby *Mesembryanthemum*. This grew in tolerable plenty about four miles inland from Faro, on dry sandy banks, among bushes of *Cistus*, *Ulex*, *Erica*, and the beautiful palm, *Chamærops humilis*, which is abundant in such spots everywhere in Algarvia. Though the plant grew in places far removed from any dwellings, I yet thought it possible that it might be found in gardens in some of the coast towns; but in spite of a diligent search and extensive inquiry, I could find no trace of its occurrence anywhere in gardens in Algarvia. Neither was it among the numerous species of Cape *Mesembryanthemums* which I had formerly had under cultivation when superintendent of the botanical gardens at Lisbon. On a careful comparison of the specimens collected with the species described in De Candolle's "Prodromus" (vol. iii., p. 415, *et seq.*), it further appeared they could not be identified with any. I therefore felt myself justified in considering it a new species indigenous to Algarvia,* and accordingly in the year 1851 I distributed specimens to several public herbaria (British Museum, Kew, Jardin des Plantes), and to a few private

* The plant is alluded to in a short note by Dr. Welwitsch, printed in the Regensburg "Flora" for 1849, p. 528, but no name is there given to it.—[*Ed. Journ. Bot.*]

collections, under the name of *Mesembryanthemum brachyphyllum* (Plantæ Lusitanicæ exsicc., n. 307).

My departure from Portugal soon afterwards, and a residence of several years in West Tropical Africa, long prevented me from giving any attention to the Portuguese flora, and it was not till recently, when I was carefully examining and describing the species found by me in Angola,* that my attention was directed anew to the plant collected in Algarvia, which I had considered to be new, and which I now endeavoured to identify by means of the most recent revision of *Mesembryanthemum*—in Harvey and Sonder's "Flora Capensis," vol. ii, p. 386—460, where 295 species of this elegant genus are described.

The difficulty of determining isolated species, especially when dried, is however very great, though much assisted by the synoptical table of species, arranged under two main groups and sixty-five sections, proposed by Salm-Dyck and retained in the "Flora Capensis." It is often very hard to decide in dried specimens to which of the main groups, *Papulosæ* or *Epapulosæ*, any particular specimen is to be referred, and it is always necessary to examine the form of the leaves and colour of the flowers, as well as the presence or absence of papillæ, before determining the point. Partly by negative and partly by positive characters, one can generally make out the sub-group of the plant under examination.

The Portuguese plant comes under the *Epapulosæ*, and falls under § 25 *aurea*, Haw. There are only two species with which it is very closely connected, *M. glaucum*, L.,† and *M. aurantiacum*, Haw., between which it is intermediate. The following is a description of the plant.

MESEMBRYANTHEMUM BRACHYPHYLLUM, Welw., n.sp. — Caulis erectus $\frac{2}{3}$ —1 ped. altus (vel basi ascendens), suffruticosus, cylindricus, lævigato-nitens, rubens vel glauco-roseus, parce e medio ramosus, ramis brevibus alternis compressiusculis, subarticulis ad interstitia $\frac{1}{2}$ —1 poll. gregato foliosis. Folia subconnata, patula, crassa, 4 v. 5 lin. longa, abbreviata, obtuse acuminata, triquetra, glauca vel glauco-pruinosa, alia minora gregata in axillis foventia. Flores solitarii, e majoribus, flavi, circiter $1\frac{1}{2}$ poll. diametri, pedunculo ebracteato 1— $1\frac{1}{2}$ poll. longo sursum incrassato recto suffulti. Calycis turbinati (v. hemisphærico-turbinati) 5 lobi lævigati, lobis e lata basi ovatis interioribus oblique ovatis latioribus margineque late scarioso-membranaceis. Petala plana, basi connata, 2- (vel etiam 3- aut 4-) seriata, horizontaliter patentia, vix linea lata, 8 lin. longa. Ovarium 5-loculare; styli 5 (vel 4, duobus nempe connatis) crassiusculi e lata basi acuminati apice recurvi.

DESCRIPTION OF TAB. 136.

Mesembryanthemum brachyphyllum, Welw. From a specimen collected in Algarvia in 1848 by the late Dr. Welwitsch.

* See "Flora of Trop. Africa," vol. ii., pp. 582-3—[Ed. Journ. Bot.]

† *M. glaucum*, E. & Z., is altogether different from the species of Linnæus, and is a member of a different section (*crocea*, Haw.). It is distinguished at once by its 4-fid calyx, and is also separated by its 8—9 (not 5) stigmas.

RECENT RESEARCHES IN THE DIATOMACEÆ.

BY REV. E. O'MEARA, A.M.

VII.

THE forms embraced in the four groups to be now considered are placed by Dr. Pfitzer, in reference to themselves and to other groups, in a relationship very different from that assigned to them by most writers of authority on the subject. The groups referred to are *Amphipleureæ*, *Plagiotropideæ*, *Amphitropideæ*, and *Nitzschieæ*. Heiberg indeed places the genus *Amphipleura* under that of *Nitzschia*, and that because the species of the former family, which he had specially examined, was that named by Smith *A. sigmoidea*—a form which I believe to be identical with *Nitzschia sigmoidea*. So under the supposition that the form named is to be properly regarded as really belonging to the genus *Amphipleura*, he was quite right in the position he assigned to it: but regarding *Amphipleura pellucida* as a genuine type of the family, its position, according to Heiberg's system of classification, is widely apart. Grunow at first placed *Amphipleura* among the *Surirelleæ*, but afterwards made it the type of a distinct group, in which he included *Berkleya*. Pfitzer agrees with Grunow as to the comprehension of *Berkleya* in the group, though he places the group itself in a very different relation. The position of *Amphipleura*, according to Ralfs, is between the *Nitzschieæ* and *Surirelleæ*. Rabenhorst placed it under the *Naviculaceæ* in his Süssw. Diat., but subsequently, in Fl. Eur. Alg., ranges it between the *Synedriæ* and *Nitzschieæ*. According to Kützing, Wm. Smith, and Prof. H. L. Smith, *Amphipleura* is assigned to a position more or less intimately associated with the *Naviculaceæ*.

The two next groups, *Plagiotropideæ* and *Amphitropideæ*, are intimately associated with the genus *Amphiprora*, Ehr., which has been regarded as nearly related to the *Naviculaceæ*, but the allied forms are by Pfitzer associated with the *Nitzschieæ*. The character which these four groups possess in common, and in consequence of which they are so intimately associated by that author, is the development of certain longitudinal lines into more or less prominent keels. Whether this characteristic should be deemed a sufficient reason to justify the arrangement referred to may be considered as liable to doubt; it is, however, important to keep this common feature in view.

Let the author now speak for himself.

Amphipleureæ, Grun.

This embraces two genera, *Amphipleura*, Kütz., and *Berkleya*, Grev. The only European fresh-water form of this group, distinguished from the *Naviculeæ* by the development of the central nodule on one longitudinal line, and the three keels of the valve—namely, *Amphipleura pellucida*, (Ehr.) Kütz.—possesses two endochrome-plates lying on the girdle-bands. A central plasm-mass is also observable. In the process of constructing auxospores, only *Berkleya Dillwynii*, (Ag.) Grun., has been observed by Lüders. For this

purpose many cells unite in a common gelatinous envelopment on the extremities of the tubes, or smaller expansions arise on the sides and middle of the tubes; two mother-cells then develop two auxospores.

The structures described by Kützing, *Bac.*, p. 112., t. 23, f. ii., 2, a b c, as the fruit of *Berkleya tenuis*, (Kütz.), appear to me, adds Pfitzer, not to belong to the *Bacillariaceæ* at all. It appears then that, so far as the internal structure of the cell is concerned, *Amphipleura* bears a strong resemblance to *Navicula*.

In case the character noted by Pfitzer—namely, the development of a central nodule on one median line, by which I understand its occurrence on one valve and not on the other—be sustained by fact, the position of *Amphipleura* will be seriously affected. In special reference to this subject I have examined very many specimens of *Amphipleura pellucida*, and could observe no trace in any of a central nodule.

Plagiotropideæ.

This embraces only one genus, *Plagiotropis*, gen. nov. The development of the median lines into prominent keels, which in the preceding group occurred to a slight extent, is more strongly marked in the two to be next treated, in which the six nodules appear again in the normal manner. The only species to be here assigned which occurred to the author in a living state was found in brackish water in the harbour of Pillau, and is distinguished from the next related genus, *Amphiprora*, (Ehr.), by the position of the keel, which, instead of being central, is strongly excentric; and also by the disappearance of the prominent longitudinal striæ, which along with the same occur in all the *Amphiprora*. The valve of *P. baltica* is sharply lanceolate in outline, resembling *Navicula serians*, (Kütz.), in breadth from one-fifth to one-sixth of its length; the keel describing a gentle curve, not sigmoid, but, as in the *Amphiprora*, sinking down at the central nodule to the plane of the valve, which it divides into two parts in the proportion of one to four, so that it is very excentric. Supposing the *Plagiotropis* to lie so as to present its valve-surface to the observer, on the upper valve the keel deviates towards the right, on the under valve towards the left, so that *Plagiotropis*, like *Pinnularia*, is diagonally constructed. The valves exhibit a very fine striation, and when dry are nearly colourless. The girdle-band view strongly resembles that of an *Amphiprora*, pretty much that of *Amphiprora indica*, (Grun.), only that the two keels obviously lie in different planes. The inner structure is similar to that of *Navicula*. Two endochrome-plates lie upon the girdle-bands, and thence with their edges stretch to some extent over the valves. Each plate covers the greater part of the valve from the keel of which it has extended, the opposite margin going a shorter distance towards the other keel. The structure of the soft parts corresponds with the diagonal construction of the cell-cover.

Amphitropideæ.

In this group we have only a single form, *Amphitropis paludosa* (Rab.), quere *Amphicampa paludosa*, Rab. Fl. Eur. Alg., p. 257. The *Amphitropideæ*, says Pfitzer, are related to the *Plagiotropideæ* somewhat as the *Cymbelleæ*, still symmetrical in outline, are to the *Naviculeæ*.

The form of the cell-cover differs little, but the inner structure is quite different. The *Amphitropis paludosa*, (W. Sm.) Rab., is distinguished by means of its sigmoid keels constructed in relation to one another, as in the case of *Scoliopleura*, as also by the two accompanying longitudinal striæ. It has only a single endochrome-plate, lying on one girdle-band, and with its margins reaching to the valves; fission takes place from the ends throughout. A central plasm-mass is obvious. Whether the similarly keeled genera, *Amphiprora*, (Ehr.), and *Donkinia*, (Pritch.), belong to this or to the preceding group remains to be determined. Auxospores in all these forms are still unknown. The concluding observation of our author suggests the propriety of subjecting the various related forms to a careful examination with a view to a satisfactory arrangement.

Nitzschieæ, (Grun.).

The forms hitherto treated of agree in this particular, that, with the exception of the *Epithemiæ*, which have a very indistinct median line, they exhibit nodules and distinct median lines; and that the transverse section is rectangular or trapezoid, except *Encyonema*, in which case it is slightly rhomboid. The *Nitzschieæ*, on the contrary, possess neither nodules nor median lines, and besides, their transverse section is ever distinctly rhomboid. This group embraces three genera, *Nitzschia*, *Ceratoneis*, and *Bacillaria*.

Nitzschia.

In which we have species of a twofold structure, which may be distinguished as similarly striate (gleichriefige) and alternately striate (wechselriefige). The valves of every *Nitzschia* exhibit on one margin a row of nodulated thickenings, called keelpuncta, which are situated in the two valves either on the same or on opposite sides. All the *Nitzschieæ* examined possess a central granular plasm-mass, in which a larger cell-kernel may be distinguished, as also a single endochrome-plate, either completely interrupted in the middle or nearly so by an elliptical opening.

The endochrome-plate in the case of the similarly striate *Nitzschieæ*, so far as the author has been able to investigate (*N. elongata*, (Hansch.), *N. flexa*, (Schum.)), lies on one girdle-band, and that the one which stands more remote from the keelpuncta; it then covers the valve, and with small folds extends to the opposite girdle-band. Some of the alternately striate *Nitzschieæ*—for example, *N. palea*, (Kütz.) W. Sm., *N. sigmoidea*, W. Sm., *N. clausii*, Hantzsch—present the same position of the endochrome-plate, while *N. dubia*, Hantzsch, and *N. linearis*, (Ag.) W. Sm., differ widely in the inner structure. In them the endochrome-plate passes freely across the cell, reaching from one row of keelpuncta to the other. When the frustule so stands as that the keels are to the eye of the observer superimposed one on the other, a narrow dark brown longitudinal band appears between two broad colourless ones. If, again, the frustule lies on one obtuse-angled edge, it appears entirely light yellow-brown. And again, if the frustule or one girdle-band lie parallel to the slip on which the object lies, the colouring of the cell, which would naturally be white, is of a somewhat darker hue, because the endochrome-

plate will be projected in a direction inclined to the plane of its acute-angled side.

We have consequently among the *Nitzschia* species with the inner and outer structure symmetrically diagonal, some having the silicious envelope and the soft inner parts unsymmetrical to one another on the homologous sides; and lastly, intermediate forms in which the silicious envelope is diagonal, and the inner structure unsymmetrical to it on the homologous sides. The cell-division has been followed out in *Nitzschia elongata* and *N. sigmoidea*. It commences with a longitudinal division of the endochrome-plate from the ends throughout, then the cell-kernel separates into two, and the division of the plasm ensues. The daughter-cells at first lie in the longitudinal axis of the cell, and then after a time assume their natural position.

Ceratoneis, Ehr.

The minute forms, *C. acicularis*, (Kütz.) Pritch., and *C. reversa*, (W. Sm.) Pritch., as regards their inner structure differ in no respect from the normal *Nitzschia*, with a single endochrome-plate lying on one girdle-band; but on the contrary *C. longissima*, (Brib.) Pritch., exhibits numerous minute plates.

Bacillaria.

The single cells of *Bacillaria paradoxa*, Gmel., have likewise a single endochrome-plate covering one girdle-band; nevertheless in the greater number of the cells of a colony the endochrome-plate appears separated into two through means of division. As respects the development of auxospores in the *Nitzschia*, we know only this, that Schuman found a form belonging to *Nitzschia* with zone-covers (zonenkleide). In addition to the coarse dark zones, there was present also a system of fine longitudinal lines on the sheath.

It is to be regretted that Dr. Pfitzer should have given the authority of his justly-distinguished name to the revival of the Ehrenbergian genus, *Ceratoneis*, for the purpose of separating the forms embraced under it from the genus *Nitzschia*, to which they belong. Grunow has well described Ehrenberg's genus, *Ceratoneis*, as a medley of heterogeneous forms, and retained the generic name to receive the single species = *Eunotia arcus*, W. Sm., in which he is followed by Prof. H. L. Smith. There may indeed be good reason for retaining the generic name so limited, but strong objections may be urged against the genus as Ehrenberg and Kützing left it. Too much praise cannot be given to Dr. Pfitzer for his observations on the genus *Nitzschia*. No doubt the forms investigated by him constitute but a small proportion of those comprehended under this extensive family; but the structural characters he has illustrated, in such as he has examined, may serve as a clue to further investigations, and can scarcely fail to lead to satisfactory results.

ON LINDSÆA LINEARIS, Sw. : WITH DESCRIPTIONS OF TWO NEW SPECIES.

BY CHARLES PRENTICE.

As some confusion exists as to the differentiation of three small species of *Lindsæa*, which, though undoubtedly distinct, have not been discriminated in any printed memoir, and are confounded together under the old and well-known species, *Lindsæa linearis*, Sw., by more than one English pteridologist, I send the accompanying diagnosis (with illustrative specimens), which I hope may contribute to define these species satisfactorily. *L. linearis*, Sw., is so generally known, and so well described by Swartz, and by Sir W. J. Hooker in the "Species Filicum," that it is not easy to understand how any difficulty has occurred in acknowledging the specific difference of the other two allied species, from which it is separated by decisive characters and by geographical distribution—*L. linearis* being found in every part of Australia, from Tasmania to Rockingham Bay, in the North of Queensland; while the other two are evidently much more circumscribed, if not confined to the latter colony.

L. INCISA, *n.sp.*—Rhizome creeping, but more slender than that of the older species; stipites slender, pale green, smooth, from three or four inches to a foot high; pinnæ numerous, deeply incised, flabellate, the larger often three-lobed, bearing *short interrupted* sori on each division, the pinnæ smaller above and below than in the middle of the frond. Matures in June, as does *L. linearis*, growing in damp shaded places. It differs, therefore, from the typical species in its uniformly pale green hue, in the deeply-lobed, smaller pinnæ, in the interrupted sori, in the colour, and in being much less robust in every part.

L. HETEROPHYLLA, *n.sp.*—Stipites tufted, sending down a cluster of rather slender radicles, and with no tendency to develope a rhizome; lower fronds uniformly shorter, bearing deeply-lobed flabellate pinnæ, which are often but not always barren, sometimes bearing interrupted sori on the divisions of the pinnæ. These fronds form a rosette, from which several simple, slender, pale green, elongated fronds emerge, from four to eight inches high, bearing on the upper half several small semi-linear, nearly entire pinnæ, which are always fertile; the whole plant smooth, rather pale green, the stipites tinged at the very base only with pale purple. Matures in July, a month later than either *L. linearis* or *L. incisa*, and generally found in drier and more exposed localities, though I have seen the three growing near each other, often in company with *L. Frazeri*. This differs from *L. linearis* in the absence of a rhizome, in the tufted radicles, in the relative length of the barren and fertile fronds, in the deeply-lobed barren pinnæ, in the colour, and in being later in developing.

DESCRIPTIONS OF SOME NEW SPECIES, SUBSPECIES,
AND VARIETIES OF PLANTS COLLECTED IN MOROCCO
BY J. D. HOOKER, G. MAW, AND J. BALL.

By J. BALL, F.R.S.

(Continued from page 273.)

Ranunculus Chærophyllos, L.; subsp. *R. leucothrix*, nob.—Differt a typo grumis cylindricis, nec ovatis, indumento ex pilis longis villosis inferne patulis superne adpressis, nec brevi adpresso sericeo, pedicellis fructiferis rigidioribus subincrassatis, foliorum tripartitorum segmento medio longiori sæpe tripartito, calyce fructifero persistente reflexo.—*Hab.* In regione inferiori Atlantis (Distr. Reraya) circa 1000^m!

A *R. Chærophyllo* facie valde diversus et forsan melius pro specie distincta habuerim, si specimina florentia adfuissent. Calyx sub anthesi reflexus est in hoc genere nota specifica gravis momenti.

Ranunculus acris, L.; subsp. *R. atlanticus*, nob.—Inter subspecies et varietates *R. acris* distinguitur imprimis statura maxima 3, 5, pedali, corolla (pro grege) maxima, rhizomate crasso horizontali fibros validos emittente, foliis magnis pentagonis profunde 3- vel 5-fidis, segmentis incisis, indumento sericeo-piloso adpresso, præsertim in foliorum pagina inferiori (folia igitur bicoloria); carpella parva numerosa rostrata, rostro subrecto longiusculo.—*Hab.* Frequens in convallibus septentrionalibus Atlantis Majoris—Urika! Reraya! Ait Mesan! Amsmiz! a 1000^m ad 1900^m.

Huic proximus est *R. Friesianus*, Jord. Obs. vi., p. 17 = *R. nemorivagus*, Jord. Diagn. i., p. 74.

Papaver tenue, nob.—Annuum (seu bienne?); planta tota pilis longis setosis vestita (folia inferiora et sepala interdum glabrescentia); folia primaria pinnata, pinnis inciso-lobatis segmentis rotundatis, caulina circuitu late triangulari-ovata, bipinnatifida, segmentis lineari-oblongis acutis; caulis subsimplicis setæ inferiores patulæ, superiores adpressæ; petala obovato-oblonga; discus convexiusculus capsulæ glabræ obovato-turbinatæ latitudine vix æqualis, crenatus, crenis vix incumbentibus; stigmata 6-7.—*Hab.* In regione media et superiori Atlantis Majoris, in convalle Ait Mesan! et in jugo Tagherot! a 1800^m ad 3000^m, in convalle Amsmiz! et in monte Djebel Tezah! a 1600^m ad 2500^m.

Proximum *P. arenario*, M.B., at differt petalis angustis nec subrotundatis, setis caulinis adpressis nec patulis, cæterisque notis. Capsula fere *P. Decaisnei* sed in hoc discus complanatus, crenæ magis discretæ.

Papaver rupifragum, Boiss. et Reut.; var. *atlanticum*, nob.—Perenne, cæspitosum; rhizoma multicaule; folia (fere omnia radicalia) setis longis albidis dense oblecta, circuitu obverse lanceolata, grosse dentata vel pinnatipartita, segmentis inæqualibus plus minusve incisis; caulis scapiformis, 8-20-pollicaris, simplex vel imo basi furcatus, adpresse setosus; flores ante anthesin nutantes, petala late obovata, sordide aurantiaca; capsula clavata, glabra, imo

basi (ad petalorum insertionem) annulo glandulifero instructa; discus convexus, crenatus, capsulae latitudinem superans.—*Hab.* In Atlante Majori, Ait Mesan! Djebel Tezah! a 2000^m ad 2600^m.

Aspectu a planta Boissieriana (in Hispania admodum rara) diversissimum; hæc enim obscure virens subglaberrima, nostra canescens undique pilosissima. Forsan melius pro subspecie habendum.

Fumaria agraria, Lag.; subsp. *F. tenuisecta*, nob.—Differt a typo sepalis angustis minimis acutis dentatis diametrum fructus non attingentibus; a *F. judaica*, Boiss., petalis multo majoribus, et ab omnibus hujus gregis valde ludibundi foliis tripinnatisectis in lacinias lineares planas mucronatas dissectis.—*Hab.* Ait Mesan! circa 1400^m. Specimen unicum legi.

Nasturtium atlanticum, nob.—Bienne (?), caespitosum, glaberrimum, ex collo radice longi verticalis caules breves debiles emittens; folia (fere omnia basilaria) profunde pinnatipartita, lobo terminali anguloso rotundato, lateralibus inæqualibus, spathulatis vel oblongo-ellipticis angulatis; pedicelli breves graciles, non incrassati; petala parva, ochroleuca; siliqua (immatura) lævis, subtorulosa, enervis; stylus apice subclavatus.—*Hab.* In regione superiori Atlantis Majoris—Ait Mesan supra Arround! Tagherot! a 2200^m ad 2800^m.

Ab affinibus (*N. asperum*, Boiss. (*Sisymbrium*, L.; DC. Prod.) et *N. Boissieri*, Coss.) differt imprimis habitu et foliis diversissimis, floribus minoribus, ochroleucis (fere albidis) nec flavis, pedicellis gracilibus nec incrassatis, siliqua enervi, nec ut in illis valvæ basi nervo notatæ. Stylus longitudine variabilis.

Arabis erubescens, nob.—A proxima *A. alpina* differt insigniter sepalis basi æqualibus coloratis, petalis dimidio minoribus erubescen- tibus, eorum lamina angustiori, pilis caulinis simplicibus vel apice furcatis, nec stellato-ramosis.—*Hab.* In jugo Tagherot, ultra 3000^m, specimen unicum immaturum et incompletum legi.

Arabis conringioides, nob.—Radix lignosus perennis, caules plurimos erectos, subsimplices, foliatis emittens; herba tota glaberrima, glaucovirens; folia inferiora orbiculata, in petiolum limbo æquilongum sensim attenuata, caulina elliptica, basi auriculata, auriculis acutis, superiora ovato-cordata, semiamplexicaulia, omnia integerrima; pedi- celli numerosi, conferti, filiformes, erecto-patuli, siliquæ $\frac{1}{3}$ vel $\frac{1}{4}$ par- tem æquantes; calyx basi subæqualis, sepalis purpurascens; petala alba, spathulata, suberecta; siliqua erecta, elongata, lævis, subcylindrica, nervo dorsali subobsoleto notata, in stylum brevem truncatum attenuata; semina 1-seriata.—*Hab.* In regione superiori Atlantis Majoris—in jugo Tagherot! a 3000^m ad 3500^m; in monte Djebel Tezah! a 2100^m ad 2800^m.

Species distinctissima, nulli proxima, facie *Conringiæ orientalis* sive *C. clavata*, Boiss.

Arabis pubescens, Poir.—Dsf. Fl. Atl., tab. 163 (sub *Turritis*.); subsp. *A. decumbens*, nob.—Perennis, e collo radice caules pluri- mos debiles decumbentes emittens; folia radicalia obverse lanceolata- acute repando-dentata, in petiolum attenuata, caulina ovato-lanceolata, profunde dentata, suprema linearia subintegra; pedicelli filiformes, patentes, siliquæ $\frac{1}{4}$ partem æquantes; petala alba seu dilute carnea; siliquæ subtorulosæ erecto-patentes valvæ dorso obsolete nervosæ;

stylus filiformis, glaber, pro genere longiusculus; stigma vix (aut ne vix) bifidum.—*Hab.* In regione superiori Atlantis Majoris—Ait Mesan, supra Arround! a 2100^m ad 2600^m. Djebel Tezah! a 2400^m ad 2500^m.

Differt a typo habitu omnino diverso, pedicellis patentibus nec adpressis, siliquis magis torulosis, stylo longiori basi discreto. Tabula Fontanesiana *A. pubescentis* habet siliquas truncatas, stylo subnullo præditas; in speciminibus nostris prope Tetuan lectis video siliquas semper in stylum attenuatas.

Alyssum alpestre, L.; var. *macrosepalum*, nob.—Differt a typo sepalis majoribus subpersistentibus siliculam semimaturam æquantibus, siliculis basi ellipticis nec cuneatis, stylo siliculam subæquante.—*Hab.* In regione media Atlantis majoris, in convalle Amsmiz!

Alyssum maritimum, Lam. (*Königa maritima*, R.Br.); var. *lepidioides*, nob.—Differt a typo racemo denso subæquali, nec basi laxo.—*Hab.* In regione inferiori ad radices Atlantis Majoris—supra Seksaoua! prope Mtouga legit J. D. H. circa 1000^m.

Brassica elata, nob.—Perennis; caulis erectus, simplex, 3-6-pedalis, superne glaberrimus subaphyllus; folia radicalia (10-14-pollicaria) et caulina inferiora lyrato pinnatifida, lobo terminali maximo, rhomboideo, inæqualiter crenato-dentato, lateralibus oppositis alternisve, ovato-cuneatis, dentatis, rachi lata cum nervis lateralibus albo-rubentia, omnia hispido-incana; inflorescentia pyramidalis e ramis brevibus patulis subæqualibus; pedicelli breves, stricti; sepala erecta, obtusa, pilosiuscula; petala saturate lutea, limbo subrotundo; siliqua subtorulosa, superne nervosa, in rostrum conicum monospermum trinerve attenuata.—*Hab.* In regione inferiori Atlantis Majoris—in rupibus solo arsis prope Seksaoua! et Milhain! circa 1000^m.

Species insignis, ab affinibus omnino dissimilis. Proxima est *B. batica*, Boiss., sed in hac rami laterales distantes erecti, nec velut in nostra planta versus apicem caulis approximati patuli, siliquæ rostrum brevius, pedicelli erecto-patentes. Ill. Boissier calycem *patentem* *B. batica* tribuit, et sepala *obtusa*, dum in tabula (Boiss. Voy. en Esp., pl. 9) pictor sepalum *acutum* perperam delineavit. In speciminibus siccis mihi obviis sepala erecta nec patentia videntur. In eadem tabula siliquæ rostrum ovulis 2 abortivis ostenditur. Ubi ovulum unum alterumve fertile adest rostrum fit longius et siliquæ dimidiam longitudinem attingit. In specie nostra et in sequente siliqua quam in *B. batica* multo minor.

Brassica rerayensis, nob.—Radix perennis; caulis e basi adscendente erectus, 1-2 furcatus, glaberrimus, subaphyllus; folia radicalia parva, incano-hirsuta, runcinato-lyrata, basin versus alterna, caulina pauca demum linearia; racemus brevis, pauciflorus; pedicelli erecto patuli, tenues, siliquam $\frac{1}{2}$ æquantes; rostrum tenue, aspermum (?), siliquæ $\frac{1}{4}$ seu $\frac{1}{6}$ partem attingens; sepala elliptico-oblonga, pilosa; petala saturate lutea.—*Hab.* In regione superiori Atlantis Majoris in convalle Ait Mesan, a 2000^m ad 2700^m.

Fructus in speciminibus nostris omnino immaturus, melius exploratus forsitan ovulum in rostro detectum fuerit. Quocunque fit a *Brassicis* planta nostra nullomodo divellenda. *Brassica batica*, Boiss., proxime affinis, differt foliis glabris vel ex setis brevibus sparsis scab-

rida, racemo elongato et præsertim siliculæ rostro crasso dispermo, nec tenui aspermo.

Brassica nervosa, nob.—Annua (?), ramosa; folia radicalia lyrata inciso-dentata, caulina pauca lanceolata, omnia in petiolo et nervis hirta; petala (pro grege) magna, læte lutea; siliquæ brevis insigniter nervosæ ex pube brevi velutinæ, rostrum glabrum, aspermum (?).—*Hab.* Specimen unicum mancum legi in Prov. Mtouga!

Planta e grege *B. geniculatæ*, certe *Brassica* (cotyledones conduplicatæ), sed descriptio incompleta.

Lepidium nebrodense, Raf. (sub *Nasturtio*)—Guss. Fl. Sic. ii., p. 154=*L. pubescens*, Tin. Cat. H. R. Panorm., p. 150=*Lepia Bonanniana*, Psl. Fl. Sic., p. 84=*Lepidium Bonannianum*, Guss. Prod. Fl. Sic., p. 211.; var. *atlanticum*, nob.—Folia radicalia spathulata longe petiolata, integra vel lyrata, caulina sessilia vix auriculata, omnia velutina; sepala glabra, purpurascentia; silicula glabra, matura interdum pubescens, breviter emarginata; stylus brevissimus.—*Hab.* In regione superiori Atlantis Majoris, vall. Ait Mesan! a 2500^m ad 3000^m.

Species per regionem mediterraneam late diffusa et valde ludibunda. Huic valde proximum est *L. calycotrichum*, Kze.=*L. granatense*, Coss.=*L. Dhayense*, Munby, quocum forsán jungendum est *L. microstylum*, Boiss. & Held. Diag., ser. ii., fasc. vi., p. 21, et Boiss. Fl. Or. i., p. 355. *L. nebrodensis* forma aberrans est (ni fallor) *L. petrophilum*, Coss. Valde affinis est species Europæ occidentalis *L. hirtum*, L., quocum adnumeranda sunt *L. heterophyllum*, Benth., *L. Smithii*, Hook., et *L. Villarsii*, G. et G., dum inter has formas characteres firmos adhuc frustra quæerunt botanici. *L. oxyotum*, DC. Syst.=*L. humifusum*, Req., est species insulæ Corsicæ propria, erronee in DC. Prod., vol i., p. 204, ad Floram Syriacam relata. Specimina enim in Herb. Labillardiere loci natalis indicatione carent, sed spec. Corsicis omnino conformia. Hoc tamen, etsi siliculæ forma sat bene distincta, est spec. nostræ forsán nimis proxima; vidi inter specimina Siciliana *L. nebrodensis* formam intermediam.

Reseda Gayana, Boiss. Voy. en Esp., pl. 21; subsp. *R. attenuata*. nob.—Radix perennis; caules 2-3 exiles 8-12 pollicares; folia inæqualiter pinnatifida, caulina abbreviata, 2-4 juga; spica gracillima, pauciflora; bracteæ lineares, pedicellos brevissimos bis terve superantes; sepala ovato-lanceolata, superiora 3 interdum coalita; petala brevissima calycem vix superantia, staminibus breviora, 2 superiora gaudent appendicula (pro grege) magna, papilloso-ciliolata, concava, et lamina appendiculam æquante, profunde trifida, lobis æqualibus; capsula (immatura) dentibus quatuor brevibus erectis coronata, pube rara brevissima adspersa.—*Hab.* In regione superiori Atlantis Majoris—Ait Mesan! et in jugo Tagherot! a 2100^m ad 3000^m.

A *R. Gayana* differt præsertim petalis minimis lamina fere ad basin trifidis, appendicula majori, capsulæ dentibus magis prominentibus. Facile sicut species distincta adnumeranda. Capsula matura characteres certiores suppetebit.

Reseda Phyteuma, L.; subsp. *R. diffusa*, nob.—Radix biennis; caulis e basi ramosissima, diffusa; folia integra (rarius trifida),

oblongo-linearia, obtusa; bracteae filiformes (pro grege) longiusculae; sepala ut in *R. macrosperma*, Rebh.; petalorum superiorum lamina brevis, antheris vix longior, 3-partita, laciniis lateralibus profunde 3-5-fidis, lacinulis apice abrupte spathulatis (fere cochleariformibus); capsula (nondum matura) insigniter 3-dentata, dentibus divergentibus. —*Hab.* In rupibus arenaceis ab urbe Marocco septentrionem versus legit cl. G. Maw, et mihi benevole communicavit.

A proxima *R. macrosperma*, Rebh., recedit petalorum lamina multo minori, lacinulis cochleariformibus nec obovato-oblongis* apice rotundatis, capsulae dentibus divergentibus, qua nota ad *R. inodoram*, Rebh., melius congruit. *Reseda macrosperma* et *R. inodora* ad subspecies, sub typo *R. Phyteuma*, L., reducendae mihi videntur. Planta nostra longius a typo recedit.

Fumana arbuscula, nob.—Frutex humilis, ramosissimus, intricatus, trunco demum diametro pollicari; ramuli recti, rigidi, foliacei; folia alterna, coriacea, infima ovalia, vix lineam longa, superiora ovali-oblonga circa 3 lineas attingentia, suprema brevissima, cum ramulis junioribus puberula; flores in quovis ramulo pauci (2-4); pedicelli sub-pollicares demum recurvati; sepala exteriora (epicalyx) brevia, linearia, scabrida, interiora membranacea, carnea, ex costis 3 viridibus hirtulis et nervo 1 utrinque non costato lineata; petala (nondum expansa) calyce aequilonga, saturate flava; semina maxima, in quavis capsula sex, pallida, laevia, oculo armato minute granulata. —*Hab.* Species insignis, in regione inferiori Atlantis Majoris admodum rara. Exemplaria duo, jam deflorata, legimus in glareosis ad torrentem Ourika (circa 1000^m)! et alterum, nondum florens, in convalle Ait Mesan (circa 1300^m)!

Semina illis *F. vulgaris* ter quaterve longiora et latiora.

Pace celeb. Bentham et Hooker, genus *Fumana*, Dun., filamentis externis anantheris moniliformibus, ovulis anatropis, seminibus raphe praeditis, et insuper habitu proprio gaudens—etiamsi in *F. viscida*, Spach minus apparente—ad sectionem *Helianthemum* non reducendum videtur.

Viola modesta, nob.—E grege *V. tricolor*, L., differt stipulis integris linearibus, foliorum nervis utrinque linea hirta notatis, sepalis intense viridibus, margine cartilagineo-ciliatis, caeterum glabris, petalis calyce brevioribus, calcare brevissimo. —*Hab.* Specimen unicum legi in monte Djebel Tezah (circa 2400^m).

Silene nocturna, L.; subsp. *S. decipiens*, nob.—Differt a typo pedicellis parce glandulosis vix viscidulis, calyce fructifero ex nervis fusco-viridibus costato, dentibus erecto-patentibus capsulam toto longitudine superantibus, ejus diametrum aequantibus, petalis capsulam vix superantibus, lamina brevi atrorubente, seminibus minimis dorso vix canaliculatis. —*Hab.* Legimus in arenosis prope Casa Blanca! (incolis Dar el Beida) et iterum (?) specimen nimis incompletum prope Amsmiz! in regione inferiori Atlantis Majoris.

* *R. macrosperma*, Rebh., in agro Tingitano sat frequens, gaudet lacinulis petalorum superiorum versus apicem paulo dilatatis, nec, ut vult clar. J. Mueller, spathulatis. Confer figuram Muellerianam (Monographie des Rése-dacées), tab. vii., fig. 97.

Planta pumila depauperata, *S. nocturnæ*, L., et *S. scabridæ*, Soy. Will., facie intermedia.

Silene cerastoides, L.; var. *anomala*, nob.—Habitū et seminibus (dorso sat profunde sed obtuse canaliculatis) est *S. cerastoides*, sed differt calyce subevenio (nervis obscure anastomosantibus), et filamentis puberulis.—*Hab.* In Imp. Maroccani provincia meridionali Mzouda!

Si hanc formam recte pro varietate habui eodem pacto *S. Giralddii*, Guss., a *S. gallica* nonnisi filamentorum glabritie distincta, ad varietatem reducenda erit.

Silene corrugata, nob.—Planta ramosissima, diffusa, glanduloso-pilosa; folia inferiora spathulato-acuminata, superiora lanceolata; pedicelli calycem demum æquantes; bracteæ 2 inæquales, major herbacea, minor subsetacea; flores distantes, ante anthesin nutantes; calyx membranaceus, viridi-striatus, nervis parallelis, basi truncatus, vix umbilicatus; petala carnea, biloba, ungue calyce longiori; carpophorum capsulam æquilongum; semina fusca, sat profunde canaliculata, dorso corrugata.—*Hab.* In regione media Atlantis Majoris; Ait Mesan! circa 1750^m.

Affinis *Silene pseudo-Atocion*, Dsf., a pl. nostra differt petalis integris, seminibus multo majoribus vix canaliculatis, calycis tubo longiori. Habitū propior est *S. pendula*, structura omnino diversa.

S. corrugata, nob.; subsp. (?) *S. adusta*, nob.—Planta pumila, erecta, pauciflora; differt insuper a *S. corrugata* foliis angustioribus, bracteis subæqualibus setaceis, petalis albidis, magis profunde bilobis, seminibus (non omnino maturis) pallide luteo-fuscis minus profunde canaliculatis, in fossa dorsali tuberculosus.—*Hab.* Prope Seksaoua! in rupibus calidissimis.

Arenaria pungens, Clem.; var. *glabrescens*, nob.—Differt a typo Hispanico sepalis glabris, nervo medio prominulo basin versus ciliato, caulibus subglaberrimis foliis connatis ad basin membranaceis ciliatis, antheris fusco-griseis nec rubentibus.—*Hab.* In regione superiori Atlantis Majoris.—Ait Mesan! versus 2550^m.

Specimina typo similia, sc. herba tota pilis brevibus articulatis vestita, legit in monte Djebel Tezah (circa 2800^m) cl. J. D. Hooker.

Polycarpon herniariodes, nob.—Planta cæspitosa; rhizoma perenne, lignosum, ramosum; caules breves, prostrati; folia lanceolato-spathulata, acuta, crassiuscula; bracteæ superiores (pro genere) latæ; sepala prorsus ecarinata, exteriora linea media notata, margine anguste scariosa; petala integerrima, sepalis æqualia; flores in spec. ex Ait Mesan triandri, in spec. ex Djebel Tezah pentandri; semina . . . —*Hab.* In regione superiori Atlantis Majoris—Ait Mesan! Djebel Tezah, J. D. H. circa 2400^m.

Species distinctissima, facie *Herniariæ alpinae*, Vill. Specimina perpaucā legimus.

Tamarix gallica, L.; subsp. *T. speciosa*, nob.—Frutex 8-10 pedalis; cortex fusco-purpureus, nitidus; racemi coëtanei in ramos lignoso et in hornotinos subsessiles; bracteæ ovatae, minus quam in *T. gallica* acutæ; sepala oblongo-rotundata, rarius ovata, subacuta; petala cito caduca; flores 5-andri; capsula (pro grege) longa, pulchre

rosea.—*Hab.* Copiose secus torrentem in Distr. Mesfioua! circa 400^m.

Frutex elegans speciosa, herba viridi, fructu roseo, e *T. gallica* et *T. africana* facie valde diversa.

Althæa hirsuta, L.; var. *grandiflora*, nob.—Differt imprimis corolla subduplo majore, purpureo-rosea, stipulis longioribus, angustioribus, subcuneatis, nec ut in typo ovatis, foliis magis divisis, laciniis angustioribus, planta tota minus hirsuta.—*Hab.* Specimina manca legimus in Imp. Maroccani meridionalis Prov. Mtouga! et Shedma!. Melius explorata forsitan sicut species nova distinguenda. In Herb. beati J. Gay (nunc Kewensi) adsunt specimina duo prope Monspelim lecta, quibus adjecit in scheda *Althæa mutica*, Gay Mss. (1824). In his corolla magna ut in rostra, sed stipulæ et folia omnino *A. hirsutæ*.

Geranium tuberosum, L.; var. *debile*, nob.—Differt a typo rhizomate horizontali, ad nodos incrassato, caule florifero debili humifuso, petalis saturate purpureis.—*Hab.* In regione superiori Atlantis Majoris. Legimus nondum florentem in convalle Ait Mesan! et in Monte Djebel Tezah! Alt. 2300^m—2600^m. Specimen unicum mancum florentem invenit cl. G. Maw.

Lotononis maroccana, nob.—Planta perennis, ramosa, prostrata; herba tota sericea; folia petiolata, trifoliolata; foliola obovata, apiculata, basi cuneata, brevissime stipitata; stipulæ 1—2 foliolata; flores sæpissime solitarii, brevissime pedicellati, calyx demum campanulatus, purpurascens, basi striis validis notatus; vexillum alalongiuscule superans extus cum carina insigniter sericeum; leguminas latiuscula, glabra, 8—10 ovulata.—*Hab.* In regione inferiori Atlantis Majoris prope Tasseremout! Ourika! Ait Mesan! Amsmiz! a 1000^m ad 1400^m.

Species probe distincta, a *L. lupinifolia*, Boiss. (sub *Leobordea*) differt imprimis foliis tri- nec quinque-foliolatis—a *L. cytisoide* toto habitu et florum structura recedit; in hac nempe vexillum carinæ subæquale, in nostra carinam et alas longe superat.

Argyrolobium Linnæanum, Walp.; subsp. *A. fallax*, nob.—Differt a typo floribus minoribus, foliorum foliolis latioribus obtusioribus, et præsertim calycis labio inferiori inæqualiter trifido, lacinia media lateralibus multo angustiori, nec subæquali, fere ut in *A. calycino* M.B. (sub *Cytiso*). Semina in quovis legumine 6—10, sæpissime 8.—*Hab.* In regione media Atlantis Superioris a 1500^m ad 2100^m.

Facies a typo diversa, sed forsitan variettem tantum sistit.

Argyrolobium Linnæanum, L.; subsp. *A. stipulaceum*, nob.—Fruticulus nanus, suberectus, ramosus; folia primaria longe petiolata; flores brevissime pedicellati, solitarii seu geminati in vertice ramulorum; stipulæ et bracteolæ ad basin calycis majores et latiores quam in *A. Linnæano*; cito marcescentes; calyx basi laxus, labii inferioris superiori longiores laciniis anguste lanceolatis subæqualibus; legumen subtorulosum, 5—6 spermum; semina flava.—*Hab.* In regione inferiori Atlantis Majoris. Prope Seksaoua! et verosimiliter eadem forma ex convalle Amsmiz et prope Tasseremout.

Forsan pro specie distincta vindicanda erit, sed characteres citati in hoc genere instabiles videntur.

Argyrolobium microphyllum, nob.—Perenne 3-6-pollicare; herba tota pube brevi rigida incana; pedunculi uniflori, axillares et terminales, folia parva breviter petiolata superantes, stipulæ minimæ; calyx coloratus, ad basin usque bisectus, labio superiori profunde bifido, inferiori ad quartam partem tridentato, dente medio subulato lateralibus lanceolatis quidquam breviori; flores parvi, calycem parum excedentes, bicolores (vexillo fulvo, carina citrina); legumen 4-5-spermum.—*Hab.* In regione inferiori Atlantis Majoris. Supra Seksaoua circa 1100^m.

Argyrolobio nullo, nisi forte *A. unifloro*, Dcne. (sub *Cytiso*), comparandum; sed ab hoc eximie differt calycis structura et floribus duplo majoribus.

Genista tricuspidata, Dsf. (Fl. Atl., tab. 183); var. *sparsiflora*, nob.—Differt floribus sparsis, ramis infertilibus longis tenuibus, foliis obverse lanceolatis in petiolum attenuatis.—*Hab.* Sat frequens in prov. meridionalibus Imperii Maroccani. Legimus in Distr. Mesfoua! prope Tasseremout! Ourika! et in monte Djebel Hadid! prope Mogador. Hoc specimen in Herb. Kewensi a cl. Lowe prope Mogador lectum cui nomen *G. gibraltarica* in scheda adjecit.

Genista myriantha, nob.—Frutex 4-6-pedalis, ramosissimus; herba tota subglaberrima; ramulorum hornotinorum debilium folia sessilia, anguste lanceolata, annotinorum obovato-oblonga, omnia parvula, 1-foliolata, carnosula, obtusa vel interdum mucronulata; stipulæ minutissimæ, bidenticulatæ; flores numerosissimi versum apicem ramulorum conferti; bracteolæ 2 marcescentes in quovis pedunculo; calycis dentes superiores triangulares tubo lævi subæquilongi, tres inferiores æquales, omnes apice ciliolati; carina vexillo æqualis, concolor, pallide flava; alæ saturate luteæ. Legumen non vidimus.—*Hab.* In regione inferiori Atlantis Majoris. In convalle Amsmiz circa 1300^m.

A *G. scorio*, DC., differt habitu, glabritie, floribus bicoloribus, calycis tubo lævi nec striato. Facie propior *G. lucidæ*, Camb., sed in hac carina vexillum valde superat, calyx profundius fissus.

Genista florida, L.; subsp. *G. maroccana*, nob.—Differt a typo pubescentia sericea copiosiore, foliis minoribus angustioribusque, floribus minoribus et calyce præ magnit. corollæ minore. Frutex erectus, 4-8-pedalis. In regione inferiori Atlantis Majoris. Legimus in glareosis convallis Ourika et iterum in convalle Amsmiz a 1000^m ad 1500^m.

Characteres quibus distinguuntur *G. polygalæfolia*, DC. Prod., et *G. leptoclada*, J. Gay, mihi videntur nimis variabiles. His etiam velut subspecies *G. floridæ* forsan addenda est *G. oretana*, Webb.

Cytisus Balansæ, Boiss in Diagn. (sub *Sarothamno*); var.? *atlanticus*, nob.—Flores solitarii axillares in ramis hornotinis inermibus, vel rarius in ramis annotinis glabris striatis pungentibus paucifoliatis; pedunculi bracteolati ad basin foliolis 2-3 obverse lanceolatis, obtusis, sericeis, ex pulvinula incrassata ortis, fulcrati; calyx parce pilosus campanulatus vix bilabiatus, labio superiori vix emarginato, inferiori brevissimo dentibus 3 subobsoletis; corolla glaberrima; vexillum carinam incurvo-falcatam et alas paulo superans; stylus apice non incrassatus magis quam in affinibus (*C. purgans* et *C. Hænsleri*)

exsertus.—*Hab.* In regione superiori Atlantis Majoris—Ait Mesan! usque in juga Tagherot! Djebel Tezah! a 2200^m ad 3000^m et ultra.

Ulterius inquirenda est ob notas differentiales inter *Cytisos* hujus gregis—*C. purgans*, L. (sub *Genista*), B. et H. Gen. Pl., *C. Hænsleri*, Boiss. (sub *Genista*), et *C. Balansæ*, Boiss. (sub *Sarothamno*)—satis constantes sint. Flores in var. nostra magnitudinæ *C. purgantis*, sed forma carinæ omnino diversa.

Ononis Maweana, nob.—Annua, e basi ramosa, parce glanduloso-hirta; folia infima et suprema unifoliolata, cætera trifoliolata, foliolo medio majori stipitato, omnia obovato- vel oblongo-lanceolata, apice rotundata (rarius retusa), argute denticulata; stipulæ inferiores elongatæ, superiores dilatatæ ovatæ acutæ argute denticulatæ; pedunculi biflori, exaristati, foliis paulo longiores, infra medium furcati, subanthesi erecti, calycis segmenta tubum 2 excedentia, angusta, quinquenervia. Nervo medio subobsoleto, lateralibus duobus utrinque approximatis, prominulis; corolla lacinias calycinis parum excedens, insigniter bicolor, vexillo pallido striato, carina (cum alis) apice aurantiaca. Legumen nondum visum.—*Hab.* In Distr. Tingitano, juxta stagna subsalsa, detexit oculatissimus G. Maw, Botanices et præsertim floriculturæ fautor egregius.

Species ut videtur omnino distincta, nec ulli proxima nisi forte *O. hebecarpæ*, Webb. Ab hac differt imprimis pedunculis infra medium nec apice tantum furcatis, stipulis ter quaterve majoribus, foliis angustioribus, et cet. *O. biflora*, Dsf., longius distat pedunculo aristato, apice tantum furcato, floribus pendulis, statura multo majori. Facie similiores sunt *O. gibraltarica*, Boiss., *O. brachycarpa*, DC. Prod., *O. natricoides*, Duf., quæ omnes præter alias notas pedunculis 1-floris aristatis distinguuntur.

O. viscosa, L.; var. ? *fruticescens*, nob.—Differt insigniter radice ramisque inferioribus lignosis, legumine et seminibus fere intermediis inter *O. viscosam* et *O. siculam*. Corolla sat magna calycem subduplo excedens. Vexillum luteum rubrostriatum.—*Hab.* Specimen unicum legi in Distr. Reraya, in reg. inferiori Atlantis Majoris.

O. sicula, Guss., ab affini *O. viscosa* differt præsertim legumine angustiori polyspermo, seminibus maturis 12—20, ellipsoideo-reniformibus, pallidis; dum in *O. viscosa* semina multo majora sunt, 3-6, compressa, atrofusca. Nostra planta melius cognita speciem novam forsan sistit, forsan nexum inter species supra memoratas.

Ononis polyphylla, nob.—Annua, pumila, e basi ramosa; herba tota virens, glanduloso-hirta; folia numerosa, approximata, trifoliolata, foliolo medio stipitato, lateralibus basi disjunctis, omnibus angustis apice dentatis; stipulæ elongatæ, demum subscariosæ vaginantes; pedunculi uniflori aristati folia et stipulas vix æquantes; vexillum segmentis calycinis æquale, apice rubescens; legumen (immaturum) oblongum, latitudine fere duplo longius.—*Hab.* In planitie ad radices Atlantis Majoris Distr. Mesfioua! et versus Tasseremout!

Habitu ad *O. pubescens*, L., accedit etsi statura multo minor; præter folia et stipulas angustiores differt pedunculis aristatis et legumine oblongo, nec breviter ovali-rhomboideo.

Ononis atlantica, nob.—Perennis, basi suffruticosa, ramis erectis;

herba tota pube brevi glandulosa vestita; foliorum subsessilium foliola omnia sessilia crassiuscula, obverse cuneata, apice tantum denticulata; stipulae brevissimae; pedunculi rigidi, uniflori, fructiferi supra aristam brevem spinescentem reflexi; calycis laciniae subaequales, tubo brevissimo 3 longiores; petala flava, vexillo carina sesqui-longiori; legumen breviter stipitatum, e basi obliqua oblongum, calyce ter longiori; semina pauca minute granulata.—*Hab.* In regione inferiori Atlantis Majoris. In convalle Amsmiz legit cl. J. D. Hooker, circa 1250^m.

Est forsā *O. cenisia*, Coss. Cat. Pl. Marocc. mss., quoad planta a Balansa detecta in monte Djebel Sidi Fars. Ab *O. cenisia*, L., recedit herba glandulosa, foliis subsessilibus, pedunculorum arista spinescente, calyce profundius fisso, petalis flavis nec purpurascens, et praesertim legumine stipitato, angustiori, et seminibus minoribus minute et undique granulatis, nec inaequaliter tuberculatis.

Propior est forsā *O. rigida*, Kze., sed in hac foliola obovata circuitu toto, nec apice tantum, dentata, stipulae longiores insigniter dentatae; legumen a me non visum nec descripsit cl. auctor.

Trigonella polycerata, L.; var. *atlantica*, nob.—Differt a typo legumine dimidio breviori, rugis transversis arcuatis nec valde elongatis, stipulis latioribus, seminibus (nondum maturis) nigro-punctatis.—*Hab.* In regione superiori Atlantis Majoris. In convalle Ait Mesan a 2100^m ad 2600^m.

Forsan melius observata pro specie aut subspecie diversa vindicanda erit.

Trifolium humile, nob.—Perenne, pumilum, caespitosum; rhizoma lignosum, ramosum, pedunculos sub-pollicares petiolis subaequales edens; foliorum foliola obovata, minute denticulata; stipulae basi scariosae, elongatae, in apicem viridem sensim attenuatae; capitulum ex pedicellis ciliatis bracteolatis demum reflexis laxum; calycis parce ciliati dentes inaequales tubo 10 nervis breviores, nervis intermediis sub sinu bifurcatis, unde dentes 3 nervii; corolla (pro grege) parva; legumen sessile, biovulatum; semina compressa, suborbicularia, hilo breviter emarginata laevissima.—*Hab.* In regione superiori Atlantis Majoris. Legi in jugo Tagherot! circa 3000^m.

Proximum *T. caespitosum*, Reyn., differt stipulis cuspidato-acuminatis nec apicem versus attenuatis, pedicellis erectis nec reflexis, bracteolis brevioribus, calycis dentibus brevioribus. Nostra species fere media est inter *T. caespitosum*, Reyn., et *T. Parnassi*, Boiss. & Sprun., a quo differt praeter alias notas seminibus laevissimis nec minute granulatis.

Melius observatae hae formae ad subspecies forsā reducendae, quibus adsocianda erit *T. pallescens*, Schreb. In Alpibus Helveticis, Sabaudis, et Pedemontanis characteres differentiales inter *T. caespitosum* et *T. pallescens* satis stabiles ego semper observavi, sed in Alpibus Carinthiae et Carnioliae formae intermediae mihi obviae sunt. Simili modo specimina *T. Parnassi* accuratius explorata inter se discrepant. Specimina ex monte Parnasso ostendunt dentes calycinos valde inaequales; superioribus tubo longioribus; spec. ex monte Taygeto gaudent contra dentibus brevissimis; spec. denique ex monte Oleno prioribus intermedia sunt.

Si pro subspeciebus unius ejusdemque speciei has formas habemus nomen *T. caespitosum*, antiquius et sat congruum, pro typo retinendum.

Trifolium atlanticum, nob.—Annuum, pumilum, e basi ramosum; herba tota molliter villosa; folia in ramis prostratis subæqualia, longiuscule petiolata, foliolis obovato-cuneatis vix denticulatis; stipulae superiores dilatatae, breviter acuminatae insigniter nervosae; capitula gemella, cylindracea, sessilia, in ramis terminalia; calycis dentes villosi subæquales, corollam pallide rubentem vix attingentes; semina minima, orbicularia, subcompressa, radícula non prominula.—*Hab.* In regione media Atlantis Majoris. Legi in convalle Ait Mesan! circa 2100^m.

Ab affini *T. Bocconi*, Savi, distinguiter imprimis ramis debilibus nec strictis, indumento villosa, foliis omnibus longiuscule petiolatis, nec inferioribus breviter petiolatis superioribus subsessilibus, calycis dentibus mollibus subæqualibus, nec rigidis inæqualibus, seminibus orbicularibus, nec reniformi ovoideis radícula prominula.

Lotus (§ *Pedrosia*) *maroccanus*, nob.—Radix lignosa, e collo ramosissima, caules adscendentes vel erecti, subæquales; folia breviter petiolata, petiolo compresso insigniter 3 nervi; foliola sessilia fol. inferiorum obovata, superiorum rhombeo-lanceolata, omnia acuminata; stipulae conformes; pedunculi terminales, rarius laterales, 1-4 flori, folio florali cæteris conformi suffulti; pedicelli reflexi, articulati; calycis dentes subæquales, subulati, tubo nervis 5 atrovirentibus notato subduplo longiores, sinu rotundato divisi; stylus dentatus; legumen (pro genere) longum, nitidum, torulosum, incurvum; semina viridia, ovoidea.—*Hab.* In provinciis meridionalibus Imperii Maroccani. Tasseremout! Ourika! Reraya! Amsmiz! Seksaoua! et prope Agadir.

Species insignis, nulli proxima, tota planta, præter legumen, molliter villosa.

Astragalus narbonensis, L.; subsp. *A. atlanticus*, nob.—Differt a typo foliorum superiorum foliolis acutis, inferiorum obtusis, dentibus calycinis minus inæqualibus et præsertim corollis sesquolongioribus, carina magis elongata, angustiori, arcuata nec abrupte geniculata, alas basi profundius auriculatas paulo superante.—*Hab.* In regione inferiori Atlantis Majoris. In convalle Ait Mesan! circa 1200^m.

Legumen nondum visum melius docebit affinitatem hujus stirpis speciosæ. Ut mihi videtur simul ac affini *A. africano*, Bge., pro subspecie sub typo *A. narbonensis* habenda est.

Astragalus prætermissus, nob.—Annuus, e collo radice ramis prostratos edens; folia 7-12 juga; foliola truncata, apice sinu lato emarginata; stipulae late ovatae, membranaceae, liberae, seu basi petiolo breviter adnatæ; pedunculi tenues, foliis breviores; flores minuti bracteati; calycis dentes subæquales tubum æquantes; vexillum lilacinum, carinam superans; legumen (immaturum) rectum, sericeum; semina . . . ?—*Hab.* In arenosis maritimis Tingitanis.

Huic proximus erit, ni fallor, *A. Gryphus*, Coss., cujus specimina nondum vidi.

Coronilla juncea, L.; subsp. *C. ramosissima*, nob.—Suffrutex ramosissimus, 1-2-pedalis; rami substriati; foliorum foliola 5-7,

petiolulata, crassiuscula, cuneata, apice truncata plus minusve emarginata, mucronulata, margine non cartilaginea; calycis dentes breves, apice ciliolati; vexilli lutei unguis calycem aliquid superans; legumen ex sutura prominula biangulata.—*Hab.* In regione inferiori Atlantis Majoris. Frequens in Distr. Reraya! et in convalle Ait Mesan! a 1000^m ad 1400^m.

Habitu et foliis a *C. juncea* dissimilis, forsitan ex legumine diverso species omnino distincta?

Coronilla pulchra, nob.—E basi suffruticosa rami tenues, herbacei, elongati, (inter frutices 9-10-pedales); folia 4—8 juga; foliola petiolulata, ovato-cuneata vel oblongo-elliptica, apice sæpius emarginata, vix mucronulata, inferiora cauli approximata, non amplexentia; stipulæ parvæ, albæ, ovales, obtusæ; flores in pedunculis axillaribus 4-8, magni, colore variabiles, ex albo purpurei, alis saturationibus; calyx quam in spec. affinibus multo major, campanulatus, dentibus latis brevissimis vel subobsoletis, latere superiori basin versus subinflatus, petala subæqualia, omnia latiora quam in affinibus; legumen longissimum (nondum maturum decimetrum superans), 10—15 articulatum; semina subcylindrica compressiuscula.—*Hab.* In regione inferiori Imp. Marocani meridionalis, versus radices Atlantis Majoris. Infra Tassermout! inter frutices; in rupibus solo arsis supra Seksaoua! et prope Milhain!

Pulchra species nullæ aliæ valde proxima. *C. grandiflora*, Boiss., quæ floribus æmula, est species herbacea calyce diverso, et stipulis majoribus ovatis mucronatis, nec parvis ovalibus obtusis, a nostra bene distincta; *C. varia*, L., floribus multo minoribus 12-18 nec 4-8 in pedunculo gaudens, differt insigniter calycis dentibus triangularibus, acuminatis, legumine multo breviori, 4—6 articulato.

In Herb. Gouan (hodie Kewensi) exstat specimen *Coronillæ* nostræ cui adjecitur in scheda manu ignota “*Coronilla gibraltarica* de Broussonet. Ex Horto Barcinonensi, 1797. Affinis *Cor. variæ* an non eadem?” Procul dubio ex Marocco meridionali allata fuit (forsan ex monte Djebel Hadid prope Mogador) et cum plantis gibraltaricis commixta, a cl. Broussonet. Nomen falsum nullibi quoad sciam citatum servare nolui.

Hippocrepis atlantica, nob.—Fruticulus radice et caulibus lignosis, ramos prostratos foliaceos edens; herba tota pilis albis brevibus vestita; folia 6—10 juga; foliola approximata, petiolulata, obtusissima, fol. infer. apice retusa; stipulæ minutæ, membranaceæ, ovatæ, obtusæ; pedunculi terminales, breves, 3-6 flori; calyx labio superiori apice bidenticulato, inferiori 3 dentato, dentes subæquales; legumen (immaturum) arcuatum, scabrum, sinubus profundis orbicularibus excavatum.—*Hab.* In regione superiori Atlantis Majoris. In jugo Tagherot! circa 2700^m.

Ab affini *H. scabra*, DC., differt foliis multijugis foliolis petiolulatis fere obcordatis, pedunculis brevioribus et stipulis obtusis. Specimina *H. scabræ*? prope Seksaoua lecta forsitan a typo Hispanico aliquid recedunt, et nostra *H. atlanticæ* propiores sunt. Legumen maturum rem certiore faciat *H. scabra*, DC. (si haud bene novi) est species perennis, nec annua sicut in DC. Prod. ii., p. 312 descripta fuit.

(To be continued.)

SHORT NOTES AND QUERIES.

A NEW IRISH LOCALITY FOR *SPIRANTHES ROMANZOVIANA*.—During a recent excursion in the west of the county of Cork, while examining some marshy ground that sloped gently upward from the edge of a small bog, a plant caught my eye, apparently a *Spiranthes*, evidently not *S. autumnalis*. On approaching more closely to examine it, you may judge of my surprise and gratification at perceiving that I had lighted on the veritable *Spiranthes Romanzoviana*, supposed ever since its discovery (now sixty-three years ago) to be confined to a narrow strip of marshy land on the margin of the “melancholy ocean,” near the remote village of Castletown, Bearhaven. A further search showed several plants growing on the short damp grass near the edge of the marsh; a few, too, were seen a little higher up where, owing to the slope, the ground was dryer. The plant was passing out of flower (it was the first week of September), but capable of the most exact verification, as you may judge from the accompanying specimen. It grew sometimes singly, and sometimes in little clusters of 3 to 5 plants, resembling in this *Spiranthes autumnalis*. Unfortunately the time at my disposal was limited, but I traced the plant in the next field, though more sparingly; beyond this the ground ceased to be favourable to its growth. Probably fully thirty plants were seen in the two small fields. As nothing but its extreme remoteness has prevented the extirpation of this most rare and interesting species at Bearhaven, I deem it absolutely necessary to decline publishing any more exact details of the new locality than between Bandon and Dunnaway. It is quite inland, at least several miles from the coast in a straight line. An interesting question is, has the *Spiranthes* reached this new station—a lonely upland glen—from Bearhaven? If so, are there no intervening stations? Or has it travelled inland from a point on the coast yet undiscovered? The latter I think improbable, partly from the nature of the neighbouring coast, and partly from the fact that no trace of it whatever has been seen by any botanist on any part of the coast line. But if the *Spiranthes* has travelled inward from Bearhaven, then, owing to the peculiar conformation of the country, its route must have been long and circuitous, and we might fairly expect to find the plant in some intervening station or stations. Now no trace of the *Spiranthes* has been seen by the many accurate observers who have searched the wide tract lying between Bearhaven and the new locality.—T. ALLIN.

A POISONOUS RUDBECKIA.—A plant sent to Dr. Vasey as having caused the death of hogs in Oregon, Missouri, proved to be *Rudbeckia laciniata*.—(Monthly Reports of Agriculture, United States, 1872, 505.)

POTENTILLA FRUTICOSA.—In the Monthly Reports of the American Department of Agriculture, 1872, p. 506, Mr. T. S. Gold, of West Cornwall, Connecticut, describes this as playing the unexpected part of an injurious weed. “It is known here by the name of ‘hardhack,’ and it is the worst plant we have. It is vastly more injurious than the Canada Thistle or Daisy. Scarcely known fifty years ago, it now covers, to the exclusion of everything else, thousands of acres in North-

western Connecticut and Western Massachusetts. It delights in strong damp pasture-land, and is rapidly taking possession of such fields. Ploughing destroys it, mowing keeps it under, and it only spreads in moist, rough pasture-land. It spreads alone by the seeds, which are blown on the surface of our winter ice and snow to great distances, and seeding in a settler's yard, it would come up in any damp fence corners where the seed would lodge. It is a new-comer here, and is twice as abundant as it was twenty-five years ago. Our old men remember when it first attracted their attention. Though still unknown in some towns, it is decidedly the worst plant we have in Berkshire and Litchfield counties."

RUMEX SYLVESTRIS.—After being taught by Mr. Warren to know *Rumex sylvestris* at Putney, I find it to be plentiful along the bend of the Thames on the Surrey side, between Kew and Richmond, mixed as at Putney with abundance of *conglomeratus* and the true *obtusifolius*. I had previously passed it over as *pratensis*, and do not find that, though both are abundant, it shades off into *obtusifolius* by gradual stages of transition. I have seen this year again *Barbarea stricta* in fine condition on the Middlesex side of the Thames, on the wall beneath the ferry, close by Isleworth Church.—J. G. BAKER.

SCABIOSA ATROPURPUREA, L., NATURALISED IN SOMERSETSHIRE.—This plant, the sweet-scented Scabious of gardens, is growing in an apparently wild state, and in great abundance, upon Dial Hill, Clevedon. It is to be found on a limestone cliff, beneath which a path passes, associated with *Centranthus ruber*, DC., *Clematis Vitalba*, L., and other plants, and has evidently, from the gnarled appearance of the roots, been growing there for some time. The finest specimens are those quite out of reach. There can be no reason why the claims of this plant as a naturalised subject should be disregarded, when *Koniga maritima*, *Antirrhinum majus*, and other escapes are admitted into our Flora. Both these plants occur in plenty at Clevedon. In September, 1862, I found *S. atropurpurea* plentiful on the sandy undercliff at Folkestone. It maintained its position there for some time, but since the new road has been made has disappeared; at least I failed, after diligent search, to find it last autumn.—J. COSMO MELVILL.

Extracts and Abstracts.

REVIEW OF THE CONTRIBUTIONS TO FOSSIL BOTANY PUBLISHED IN BRITAIN IN 1872.

BY WILLIAM CARRUTHERS, F.R.S.

THE following papers have been published :—

BIDNEY, E. W. On *Stauropteris Oldhamia*, sp. nov. Monthly Microsc. Journ., vol. vii., March, 1872, pp. 132, 133.

This name is proposed for a fossil from Oldham resembling *Psaro-*

nus Zeidlerii, Corda; the author records the discovery of specimens of *Zygopteris*, and his conviction that Cotta's *Medullosa elegans* is "merely the rachis of a fern, or a plant allied to one."

———— The Flora of the Carboniferous Strata. Part III. Palæont. Soc., pp. 63-96, pl. xiii.-xviii.

This part is devoted to drawings and descriptions of specimens of *Lepidodendron Harcourtii*, *Sigillaria vascularis*, and *Halonina regularis*. The author considers the last fossil to be the roots of *Lepidodendron*.

CARRUTHERS, W. Notes on some Fossil Plants. Geol. Mag., vol. ix., pp. 49-56, pl. ii.

The author gives—1. A restoration of a frond of *Palæopteris Hibernica*, Schimper, from Kiltorkan, Ireland, and placing it in the *Hymenophylleæ*, investigates its relation to existing forms. 2. Figures and descriptions of Hymenophylleous sporangia from the Coal-measures. 3. A short notice of *Osmundites Dowkeri*, Carr., from the Eocene beds at Herne Bay. 4. An investigation of *Antholithes* of the Coal-measures, in which it is shown that their fruit is *Cardiocarpon*, and that they were probably the inflorescences of *Gymnosperms*. Two species are described. 5. Specimens of Coniferous Wood from the Coal-measures and the Wealden are figured and described. And 6. *Pothocites Grantoni*, Paterson, a monocotyledonous inflorescence from the Coal-measures, is figured.

———— On the Tree-ferns of the Coal-measures, and their Affinities with existing Forms. Abstract. Geol. Mag., vol. ix., pp. 465-467. Journal of Botany, vol. x., pp. 279-281.

The abstract of paper read to the British Association, in which the Ferns are grouped in three divisions, severally represented by *Caulopteris*, *Tubicaulis*, and *Stemmatopteris*, the stem of the last being of a type now extinct, though the fronds and inflorescence were probably the same as those of some existing arborescent *Polypodiaceæ*.

———— Notes on Fossil Plants from Queensland, Australia. Quart. Journ. Geol. Soc., vol. xxviii., pp. 350-356, pl. xxvi. and xxvii.

Contains an account of Fossils collected by Mr. R. Daintree, belonging to Devonian and Oolitic formations, with figures and descriptions of three new species.

———— On the History, Histological Structure, and Affinities of *Nematophycus Logani*, Carr. (*Prototaxites Logani*, Dawson), an Alga of Devonian Age. Monthly Microscopical Journal, vol. viii., Oct., 1872, pp. 160-172, pl. xxxi. and xxxii.

The author points out that the same fossil had been described by Dr. Dawson under the two names *Prototaxites Logani* and *Nematoxylon crassum*, and had been referred by him to *Taxineæ* from its microscopic structure. The author shows that the fossil is not made up of wood-cells, but entirely consists of cellular filaments of two sizes interwoven irregularly into a felted mass, and that its affinities are with the cellular Cryptogams. Reasons are given for placing it among the filamentous Chlorosperms, and the name is changed, because of the error implied in both generic names applied by Dr. Dawson, into *Nematophycus*.

———— On the Structure of the Stems of the Arborescent Lycopodiaceæ of the Coal-measures.—IV. On a leaf-bearing branch of a species of *Lepidodendron*. Monthly Microsc. Journ., vol. vii., February, 1872, pp. 50-54, pl. vii. and viii.

The minute structure of a small stem and of the leaf bases is figured and described, and the bearing the specimen has on the characters which separate *Lepidophloios* from *Lepidodendron* is investigated.

DICKIE, GEORGE. Notice of a Diatomaceous Deposit. Trans. Bot. Soc. Edinburgh, vol. xi., p. 394.

An enumeration of 40 species of *Diatomaceæ* found in a peat-bog at Methlic, Aberdeenshire.

DYER, W. T. THISELTON. On some Coniferous Remains from the Lithographic Stone of Solenhofen. Geol. Mag., vol. ix., pp. 150-153 and 193-196.

The author describes separate scales of a cone under the name *Araucarites Häberleinii*, Dyer, and investigates the different Coniferous branches found at Solenhofen, referring them to three genera—*Pinites*, 1 species; *Athrotaxites*, 5 species; and *Condylites*, 1 species.

———— On some Fossil Wood from the Lower Eocene. Geol. Mag., vol. ix., pp. 240-243, pl. vi.

The author describes the occurrence in this specimen of wood of cells in the interior of the ducts, and gives the received explanation of their origin.

HEER, OSWALD. On the Carboniferous Flora of Bear Island. Quart. Journ. Geol. Soc., vol. xxviii., pp. 161-169.

The author considers that the fossil plants from Bear Island are more nearly related to the Carboniferous than to the Devonian, and he consequently places them and the fossils of Yellow Sandstones of Ireland, which he believes to be of the same age as the fundamental series of the Lower Carboniferous system, under the name of the Ursa stage.

———— On *Cyclostigma*, *Lepidodendron*, and *Knorria*, from Kiltorkan. Quart. Journ. Geol. Soc., vol. xxviii., pp. 169-172, pl. iv. Abstract. Geol. Mag., vol. ix., p. 134.

Prof. Heer maintains the specific distinctness of *Cyclostigma Kiltorkense*, Haught., *C. minutum*, Haught., *Knorria acicularis*, Göpp., and *Lepidodendron Veltheimianum*, Sternb., all from Kiltorkan, which I had maintained to be fragments of the same species. He figures and describes his species.

HIGGINS, REV. H. H. On some specimens supposed to be *Pycnophyl-lum* in the Ravenshead collection of fossils, Free Public Museum, Liverpool. Proceedings Liverpool Geol. Soc. 1872, pp. 71-74, with plate.

The curious stems figured and described by the author are amorphous casts of Fern-stems of the *Caulopteris* type.

MACLOSKEY, REV. DR. On the Silicified Wood of Lough Neagh, with notes on the Structure of Coniferous Wood. Abstract. Journ. Bot., vol. x., pp. 93-95.

The author describes *Cupressoxylon Pritchardi*, Kr., and gives an account of the conditions under which it occurs.

MARRAT, F. P. On the Fossil Ferns in the Ravenshead Collections. Proceedings Liverpool Geol. Soc. 1872, pp. 4-16, pl. 1-13.

The author enumerates 62 species, 9 of which he considers undescribed, and he gives them names. The figures and descriptions are scarcely sufficient for independent investigators to determine the characters which distinguish them from already described species.

PEACH, C. W. On Fossil Plants from the Coal-fields of Slamannan, Falkirk, Dreside, Tillicoultry, &c. Abstract. Trans. Edin. Bot. Soc., vol. xi., p. 342.

An enumeration of some of the more remarkable fossils the author collected in the localities specified.

————— On a Cone of *Flemingites gracilis* attached to its stem. Abstract. Trans. Edin. Bot. Soc., vol. xi., pp. 356.

The author describes the specimens he had found.

WILLIAMSON, W. C. On the Structure of the *Dictyoxyloids* of the Coal-measures. Abstract. Report Brit. Assoc. 1871, pp. 111, 112.

Three species are shortly described—*Dictyoxyloids Oldhamium*, *D. radicans*, and *D. Grievii*.

————— On the Organisation of the Fossil Plants of the Coal-measures. Part I. CALAMITES. Phil. Trans., vol. clxi., pp. 477-510, pl. xxiii-xxix.

The author figures and describes in detail the specimens in his cabinet, and proposes to divide the *Calamites* into two generic groups, retaining *Calamites* for the stems which have no infranodal canals, as indicated by the absence of verticils of round or oblong scars, and adopting *Calamopitius* for those which have such canals.

————— On the Organisation of the Fossil Plants of the Coal-measures. Part II. LYCOPODIACEÆ: *Lepidodendra* and *Sigillariae*. Phil. Trans., vol. clxii., pp. 197-240, pl. xxiv.-xxxi.

The author figures and describes in detail sections of *Lepidodendron*, *Ulodendron*, *Halonias*, *Diploxyloids*, and *Sigillaria*. He considers *Anabathra* of Witham to be the same as *Diploxyloids*, and among the stems described he distinguishes four species to which he gives specific names. He considers the whole belong to the same group, and that they are Lycopodiaceous.

————— Notice of further Researches on the Fossil Plants of the Coal-measures, in a Letter to Dr. Sharpey, Sec. R.S. Proc. Roy. Soc., vol. xx., pp. 95, 96.

The author records the progress of his investigations into the nature of a *Lepidodendroid* plant and its fruit from Burntisland, and of an *Asterophyllites* from Lancashire, which he proposes to submit to the Society speedily.

————— On the Organisation of the Fossil Plants of the Coal-measures. Part III. LYCOPODIACEÆ. Abstract. Proc. Roy. Soc., vol. xx., pp. 199-203.

A plant from Burntisland—*Lepidophloios brevifolium*, Williamson—is described at length, and reasons are given for uniting the genera *Diploxyloids*, *Anabathra*, *Lomatophloios*, and *Leptoxyloids*.

———— Notice of further Researches among the Plants of the Coal-measures. Proc. Roy. Soc., vol. xx., pp. 435-438.

The author refers to investigations which induce him to propose a new genus (*Astromyelon*) for Calamite-stems already figured by him, to change his *Dictyoxylon radicans* into *Amyelon radicans*, and which show that *Asterophyllites* is not the branch of a Calamite. He also refers to stems of petioles from Burntisland, on which he proposes to found two new genera, *Arpexylon* and *Edraxylon*, as well as to the occurrence of *Zygopteris Lacattii* in Lancashire.

Synopsis of the Genera and Species described in the foregoing papers :

ALGÆ.

Nematophycus Logani, Carr., Month. Micro. Journ., 1872, p. 160, plate xxxi. and xxxii. Devonian. Canada.

FILICES.

Amyelon radicans, Williamson, Proc. Royal Soc., vol. xx., p. 438.

Arpexylon, Williamson, Proc. Roy. Soc., vol. xx., p. 438.

Cyclopteris cuneata, Carr. Quart. Journ. Geol. Soc., vol. xxviii., p. 355, pl. xxvii, f. 5. Oolite. Queensland.

Edraxylon, Williamson, Proc. Roy. Soc., vol. xx., p. 438.

Medullosa elegans, Cotta; Binney, Mon. Micro. Journ., vol. vii., p. 133. Carboniferous. Oldham.

Nephropteris denticulata, Marrat, Liverpool Geol. Soc. Proc., 1872, p. 11. Carboniferous. Ravenshead.

N. triangularis, Marrat, l.c., p. 11, pl. i., fig. 1. Carboniferous. Ravenshead.

Odontopteris neuropteroides, Marrat, Liverpool Geol. Soc. Proc., 1872, p. 14, pl. vii., f. 1 and 2. Carboniferous. Ravenshead.

Osmundites Dowkeri, Carr., Geol. Mag., vol. ix., p. 52, pl. ii., figs. 8 and 9. Tertiary. Kent.

Palæopteris Hibernica, Sch.; Carruthers, Geol. Mag., vol. ix., p. 49, pl. ii., figs. 1-4. Devonian. Kiltorkan, Ireland.

Pecopteris odontopteroides, Morris; Carruthers, Quart. Journ. Geol. Soc., vol. xxviii., p. 355, pl. xxviii., f. 2 and 3. Oolite. Queensland.

Sphenopteris coriacea, Marrat, Liverpool Geol. Soc. Proc., 1872, p. 5, pl. ix., f. 1 and 2. There are no characters given to distinguish this from *S. Hibberti*, Lindl. & Hutt. Carboniferous. Ravenshead.

Sphenopteris elongata, Carr., Quart. Journ. Geol. Soc., vol. xxviii., p. 355, pl. xxvii., f. 1. Oolite. Queensland.

S. Footneri, Marrat, l.c., p. 8, pl. viii., f. 2, 3. Carboniferous. Ravenshead.

S. multifida, Marrat, l.c., p. 9, pl. v., f. 4. Carboniferous. Ravenshead.

S. obliqua, Marrat, l.c., p. 6, pl. ix., f. 3. Carboniferous. Ravenshead.

S. plumula, Marrat, l.c., p. 6; pl. v., f. 3. Carboniferous. Ravenshead.

S. pulchra, Marrat, l.c., p. 8, pl. viii., f. 1 = *Pecopteris repanda*, Lindl. & Hutt. *Carboniferous*. Ravenshead.

Stauropteris Oldhamia, Binney, Month. Micr. Journ., vol. vii., p. 132. *Carboniferous*. Oldham.

Tæniopteris Daintreei, M'Coy; Carruthers, Quart. Journ. Geol. Soc., vol. xxviii., p. 355, pl. xxvii., f. 6. *Oolite*. Queensland.

EQUISETACEÆ.

Astromyelon, Williamson, Proc. Royal Soc., vol. xx., p. 435.

Calamites, Williamson, Phil. Trans., vol. clxi., p. 477-510, pl. xxiii.-xxix.

Calamopitus, Williamson, l.c.

LYCOPODIACEÆ.

Cyclostigma Kiltorkense, Haught.; Heer, Quart. Journ. Geol. Soc., p. 169; pl. iv., f. 4, 5. *Devonian*. Kiltorkan.

C. minutum, Haught.; Heer, l.c., p. 169, pl. iv., f. 2, 3. *Devonian*. Kiltorkan.

Diploxyton cycadeoideum, Corda; Williamson, Phil. Trans., vol. clxii., p. 239, pl. xxvi.—xxviii.

D. cylindricum, Williamson, l.c., pl. xxviii., fig. 33, 34.

D. stigmarioideum, Williamson, l.c., p. 239.

D. vasculare, Williamson, l.c., pl. xxv., fig. 8-11.

Favularia, Williamson, Phil. Trans., vol. clxii., p. 210, pl. xxvii. and xxviii., fig. 29-32.

Knorria acicularis, Göpp., var. *Bailyana*; Heer, Quart. Journ. Geol. Soc., vol. xxviii., p. 170; pl. iv., f. 6. *Devonian*. Kiltorkan.

Lepidodendron, structure of a leaf-bearing branch; Mon. Micr. Journ., vol. vii., 1872, p. 50, pl. vii. and viii.

Lepidodendron nothum, Unger; Carruthers, Quart. Journ. Geol. Soc., vol. xxviii., p. 353, pl. xxvi. *Devonian*. Queensland.

L. Veltheimianum, Sternb.; Heer, Quart. Journ. Geol. Soc., vol. xxviii., p. 171, pl. iv., f. 1. *Devonian*. Kiltorkan.

L. selaginoides, Sternb.; Williamson, Phil. Trans., vol. clxii., p. 199, pl. xxiv. and xxv.

Lepidophloios brevifolium, Williamson, Proc. Roy. Soc., vol. xx., p. 203. *Carboniferous*. Burntisland.

Ulodendron, Williamson, Phil. Trans., vol. clxii., p. 209.

CONIFERÆ.

Athrotaxites princeps, Ung.; Dyer, Geol. Mag., vol. ix., p. 194, pl. v., fig. 2. *Upper Oolite*. Solenhofen.

A. Frischmanni, Ung.; Dyer, Geol. Mag., vol. ix., p. 194, pl. v., fig. 3. *Upper Oolite*. Solenhofen.

A. (?) laxus, Dyer, l.c., p. 195, pl. v., fig. 6. *Upper Oolite*. Solenhofen.

A. longirameus, Dyer, l.c., p. 195, pl. 5, fig. 5. *Upper Oolite*. Solenhofen.

A. lycopodioides, Ung., l.c., p. 194, pl. 5, fig. 4. *Upper Oolite*. Solenhofen.

Araucarites Häberleinii, Dyer, Geol. Mag., vol. 9, p. 150, fig. 1-3. *Upper Oolite*. Solenhofen.

- Condylites squamatus*, Dyer, Geol. Mag., vol. ix., p. 195, pl. v, fig. 7. *Upper Oolite*. Solenhofen.
Cupressoxylon Pritchardi, Kr.; Macloskie, Journ. Bot., vol. x., p. 93. *Tertiary*. Lough Neagh.
Pinites Solenhofenensis, Dyer, Geol. Mag., vol. ix., p. 193, pl. v., fig. 1. *Upper Oolite*. Solenhofen.
Pinites Withami, Lindl. & Hutt.; Carruthers, Geol. Mag., vol. ix., p. 58, fig. 4. *Carboniferous*. Edinburgh.
Prototaxites Logani, Dawson; see *Nematophycus*.

GYMNOSPERMÆ?

- Antholithes*, Brongn.; Carruthers, Geol. Mag., vol. ix., p. 52.
Cardiocarpon, Brongn.; Carruthers, Geol. Mag., vol. ix., p. 52.
Cardiocarpum australe, Carr., Quart. Journ. Geol. Soc., vol. xxviii., p. 356, pl. xxvii., f. 4. *Oolite*. Queensland.
C. Lindleyi, Carr., l.c., p. 56, f. 1 and 2. *Carboniferous*. Falkirk.
C. anomalum, Carr., l.c., p. 57, f. 3. *Carboniferous*. Coalbrook Dale.

MONOCOTYLEDONES.

- Pothocites Grantoni*, Paterson; Carruthers, Geol. Mag., vol. ix., p. 58, fig. 6. *Carboniferous*. Edinburgh.

Notices of Books.

Flora Orientalis: sive Enumeratio plantarum in Oriente, a Græcia et Ægypto ad Indiæ fines, hucusque observatarum; auctore E. BOISSIER. Volumen secundum. Genevæ et Basileæ. 1872. (Pp. 1159.)

THE present instalment of this most valuable work, which extends to *Cornaceæ*—as far as the first volume of Bentham and Hooker's "Genera"—fully maintains the high reputation of its author as an able and accomplished botanist, with an unrivalled critical knowledge of the vegetation of Western Asia. A few brief observations on some of the author's views may not be uninteresting. Seven species of *Pistacia* are admitted, some of which must doubtless be united to *P. Terebinthus*. In *Rhamnus*, De Candolle's old sections are maintained; but these are so weak that it would probably be better to acknowledge but two, *Eurhamnus* and *Frangula*, the latter regarded by R. Brown, A. Gray, and many botanists as a good genus. In *Trigonella*, of which sixty-nine species are enumerated, Bentham's seven sections are reduced to two, *Eutrigonella* and *Pocockia*. *Medicago* is divided sectionally in a way peculiar to the author. The excellent arrangement of Koch is followed in classing the 144 species of *Trifolium* enumerated, except that Presl's section *Paramesus*,

which seems hardly separable from *Trifolium*, is admitted. Mr. Bentham has, however, shown that these sections fall under two well-marked subgenera, for which the names *Eutrifolium* and *Pseudanthyllis* may conveniently be adopted. Of the enormous genus *Astragalus* 757 species are recorded, being more than 150 above the estimate in the "Genera" for the whole world. In grouping these Bunge's elaborate monograph "*Astragali species gerontogæ*" has been followed in the main, some transpositions and changes being made. The subseries, however, of the perennial species are not equivalent in rank to those admitted amongst the annual ones; and it appears to the writer a great evil that, in a genus in which, as acknowledged by M. Boissier, "*characteres graviores et transitus non præbentes fere omnino desunt*," no less than ninety-one sections, each distinguished by a substantive name, should be admitted. To those occupied with these plants this volume is indispensable, for unfortunately Prof. Bunge gives only the diagnoses of his new species in his laborious revision, so that it cannot be made use of without reference to a very great number of works—many not always readily accessible. *Orobanchaceæ*, it is to be regretted, is still kept distinct ("*quadam pietate*," just as Koch admitted both *Carum* and *Bunium*) from *Lathyrus*, to which J. Gay long ago showed the necessity of uniting it; and appears even worse limited than usual. *Goebelia* and *Keyserlingia*, two new genera, are separated from *Sophora*, but do not leave this genus in a better state than before. In *Rosaceæ*, *Persica*, *Amygdalus*, *Cerasus*, *Armeniaca* are kept apart from *Prunus*; *Malus*, *Cydonia*, *Sorbus*, and *Mespilus* from *Pyrus*: it is impossible to regard this as other than a retrograde step. Of forty-six Roses described, fifteen are considered quite new; but it is just now the fashion to create species in this genus. The Oriental *Rubi*, however, appear hitherto to have got off scot-free, for but ten are given. Here are fresh fields and pastures new—"intactæ regionis opulentia"—for some disciple of P. J. Müller. Sixty-nine species of *Potentilla* are enumerated, but they are not classed according to Lehmann's "Revisio." *Poterium* and *Sanguisorba*, united by Bentham and Hooker, A. Braun, and Asa Gray, are here retained apart. In arranging the *Saxifragæ*, Engler's recent monograph is not referred to, the old sections being admitted, with the addition of Grisebach's *Cymbalaria*. In the classification of the *Apiaceæ* Koch is followed in the main, but with several changes, and the reductions of genera proposed by Bentham are for the most part rejected. Much labour and thought have evidently been devoted to this intricate family. *Hedera poetarum*, Bertol., and *H. colchica*, C. Koch, are both assigned specific rank, but Seemann's investigations are not alluded to. Under *Cornus*, by a misprint, both sections are named *Tanycrania*: the second should be *Thelycrania*; the first is Dr. Hooker's fourth division, well distinguished from the typical *Tanycraniæ* by its yellow flowers and small herbaceous bracts, and for which the present writer has suggested the name of *Chrysocrania*. The volume is altogether a most able and welcome contribution to systematic botany, the diagnoses and remarks brief and to the point; but the geographical distribution is sometimes imperfectly given, and it is impossible to withhold a protest against the Latinity of such a phrase as "*species curiosa*."

H. F. H.

Botanical News.

ARTICLES IN JOURNALS.

Ann. des Sciences Nat. (ser. 5, tom. xvii., n. 4—6, June) —H. Emery, "On the Action of Foliar Organs on Calorific Radiation."—P. van Tieghem, "Physiological Researches on Germination."—H. Philibert, "Observations on Hybridity in Mosses" (pl. 18).—E. Janczewski, "On Anatomy of the Porphyras, and on the 'Propagules' of *Sphacelaria cirrhosa*" (pl. 19).—P. van Tieghem and G. Le Monnier, "Researches in the Mucorineæ" (pl. 20—25).—E. De la Rue, "Development of *Sorastrum*."—G. de Saporta, "Forests buried under the Eruptive Ash of the Extinct Volcano of Cantal."

AUGUST.

Grevillea.—M. J. Berkeley, "North American Fungi" (contd.).—W. Phillips, "Lichens in North Wales."

Monthly Microsc. Journal.—J. W. Dawson, "Remarks on Mr. Carruthers' view of *Prototaxites*" (*Nematophycus*, Carr.).

American Naturalist.—W. J. Beal, "Phyllotaxis of Cones."—C. E. Bessey, "Sensitive Stamens in *Portulaca*."

Bull. Bot. Soc. France (tom. xx., p. 1).—C. Roumeguère, "Singular Reproduction of a Myxogastre."—O. Debeaux, "On Two Species of *Antirrhinum* new to France" (*A. intermedium*, Deb.=*A. majus*, var. *hybridum*, Benth., and *A. ruscinonense*, Deb.=*A. siculum*, var., Gussone).—P. Petit and A. Larcher, "Plants near Paris in January, 1873."—J. Decaisne, "Remarks on Species of *Eryngium* with parallel-veined leaves" (six new species defined).—A. Chatin, "Notes on the Truffle."—A. Boreau, "Description of a new Umbellifer" (*Thysselinum Cruanorum*, Bor., from Finistère).—C. Roumeguère, "Notes on Cultivation of *Stemonitis oblonga*."—J. Triana, "The Condurangos."—M. Cornu, "Changes in Vines attacked by *Phylloxera*."—A. Chatin, "On the Androecium of *Labiatae*, *Globulariaceae*, and *Scrophulariaceae*."—E. Prillieux, "On Potatoes with filiform Germs."—J. Duval-Jouve, "Deformity of *Zostera nana* caused by an Entophyte."—E. Cosson, "On the Botanical Geography of Marocco."—A. Chatin, "Botanical Excursion at Chapelle-sur-Erde" (Brittany).—Chaboisseau, "Origin of Name of *Woodsia ilvensis*."—D. Clos, "Calyx of *Gentianaceae* and *Portulacaceae*."—J. Decaisne, "On Three Species of *Hydnora* (*H. (Dorhyna) angolensis*, n.s., *H. (D.) abyssinica*, n.s., *H. (Euhydnora) aethiopica*, n.s.).—Morelet, "Obituary Notice of Welwitsch."—Duval-Jouve, "Peculiarities of *Zostera marina* and *Z. nana*."—Ib., "On a Form of Epidermal Cell which seems peculiar to *Cyperaceae*."—J. E. Planchon, "On the Fritillaries of France."

Flora.—A. Kanitz, "Some Problems in General Botany."—H. Christ, "The Roses of Italy."—A. Minks, "On *Leptogium corniculatum*, (Hffm.) Mks." (tab. 4).—E. Strasburger, "Are the Coniferæ Gymnospermous or not?"—E. Godlewski, "Dependence of Starch-formation in Chlorophyll-granules upon the Carbon of the Atmosphere."

Hedwigia.—T. von Thumen, "Mycological Notes."—"On *Hydnum Stohlii*, Rehb., n.s."

Bot. Zeitung.—G. Winter, "Remarks on Genus *Sordaria*" (contd.).—G. Kraus, "Age and Growth of East Greenland Woody Plants."—Flükiger, "On *Rheum officinale*."—J. Kühn, "The Mildew of the Red Beet."—Ib., "Use of Sulphate of Copper as a Remedy for 'Steinbrand' in Wheat."—G. Briosi, "Normal Composition of the Fatty Substance in Chlorophyll."

Oesterr. Bot. Zeitschr.—L. Celakovsky, "On the notion of a Species in nature, especially in Botany."—R. de Uechtritz, "*Hieracium Jankæ*, n.s."—V. de Janka, "Plant. nov. Turc. breviarium" (contd.) (*Verbascum humile*, *Veronica Bungabecce*, *Nectaroscordium bulgaricum*, *Colchicum turcicum*).—H. Kalbruner, "On the Chalk Flora of the Manhartsberge in Lower Austria."—A. Kerner, "Distribution of Hungarian Plants" (contd.).—A. Val de Lievre "Notes on *Ranunculaceæ*, &c." (contd.).—M. von Tommasini, "Flora of S. Istria" (contd.).—J. Krzisch, "Revision of Plant-localities near Wiener-Neustadt."

Mr. Watson has printed for private distribution, under the title of "Topographical Botany," the first part, containing all the Dicotyledons, of his summary of the distribution of British plants through the 112 counties and vice-counties of Great Britain. Those British botanists who are interested in county distribution cannot do better than send to the author specimens and notes of additional species for insertion in part 2, which will also include the Monocotyledons.

The second part of vol. xxix of the Linnean Society's Transactions consists of a continuation of the Botany of the Speke and Grant Expedition in East Africa. The enumeration is carried on to the end of the *Compositæ*. *Peucedanum Grantii*, *Lefeburia brachystyla*, *Loranthus usuiensis*, *Pentas purpurea*, *Otomeria madiensis*, *Oldenlandia effusa*, *Plectronia venosa*, *Fadogia fuchsoides*, *Ixora* (*Pavetta*) *ternifolia*, *Spermacoce dibrachiata*, *S. Kotschyana*, *Gutenbergia cordifolia*, *Vernonia turbinata*, *V. Petersii*, *V. violacea*, *V. Karaguensis*, *V. Thomsoniana*, *V. Grantii*, *Erigeron Grantii*, *Sphæranthus polycephalus*, *Helichrysum Kirkii*, *Porphyrostemma Grantii*, *Pulicaria Grantii*, *Wedelia mossambicensis*, *Coreopsis Grantii*, *Bidens lineariloba*, *Emilia cæspitosa*, *Senecio discifolius*, *Berkheya Spekeana*, *Echinops amplexicaulis*, *Phyllactinia Grantii*, *Erythrocephalum nutans*, *E. longifolium*, *E. minus*, and *Dicoma Karaguensis*—in all thirty-five—are the new species described in this fine contribution to African Botany, which is illustrated with thirty-five plates.

The death is announced at Quito, on June 29th, of William

Jameson, for forty-four years Professor of Chemistry and Botany in the University of that city. He was born in Edinburgh in 1796, and after taking his diploma, went in 1818 and 1820 to Baffin's Bay as surgeon in whale-ships, and collected plants on the West Coast of Greenland, a catalogue of which was published by Dr. Greville in the "Memoirs of the Wernerian Society" for 1821, pp. 416—436, with a figure of *Potentilla Jamesoniana*.* He afterwards voyaged to Lima and Guayaquil, and in 1826 arrived at Quito, where he resided till 1870, when he paid a visit to England, only returning to Quito last year. The "Synopsis Plantarum Æquatorien-sium," in two vols., was published at Quito, at Government expense, and under great difficulties, in 1865. Dr. Jameson is the author also of several papers in Hooker's "London Journal of Botany," &c., and has greatly enriched our herbaria by his extensive collections of the plants of Ecuador. A longer notice will be found in the "Gardener's Chronicle" for 1872, p. 1622.

Indian Botany has been deprived of one of its most diligent workers by the death of Dr. J. Lindsay Stewart, late Conservator of Forests in the Punjab. Dr. Stewart was a native of Forfarshire, and obtained his medical education in Glasgow, where he was a pupil of the late Professor G. A. Walker Arnott. After graduating he proceeded in 1856 to the Presidency of Bengal as assistant-surgeon; he was present at the siege, assault, and capture of Delhi in 1857, and in 1858 he joined the expedition to the Yuzufzai country. In 1860-61 he officiated for Dr. W. Jameson as Superintendent of the Botanic Garden, Saharumpore, and of the Government Tea Plantations in the North-Western Provinces and the Punjab; and in 1864 he was employed in arranging a system of forest conservancy in the land of the five rivers. His position at Saharumpore gave him an excellent opportunity of becoming acquainted with the vegetation of the Terai and North-West Himalaya, and afterwards at Bijnour he studied the Flora of the Rohilkund forests, and of the outer valley between the Ganges and Sardah. As Conservator of Forests in the Punjab, his duties took him to all parts of that province, and he extended his journeys to the adjoining province of Sindh, to Kashmir, and to the arid, treeless, but botanically most interesting inner Himalayan tracts on the Upper Indus, Chenab, and Sutlej rivers, which adjoin Turkestan and Tibet. During his journeys, under the most difficult circumstances, he maintained with great persistence his habit of taking copious notes on the spot, and in this manner he accumulated an immense store of valuable information regarding the natural history, the properties, uses, and the vernacular names of the plants of North-West India. The results of these researches are embodied in numerous papers published in the Journal of the Royal Geographical Society; the Asiatic Society of Bengal; the Agri-Horticultural Society of India; and the Transactions of the Botanical Society of Edinburgh. A most interesting account of the vegetation of the extreme north-west corner of the Punjab and the hills beyond it, which he studied during the Yuzufzai Campaign, is contained in his

* Since identified with *P. Vahlia*na, Lehm.

"Memoranda on the Peshawur Valley, chiefly regarding its Flora," (Journ. As. Soc., 1863), and in his "Notes on the Flora of Wuzuristan" (Journ. Roy. Geo. Soc., 1863). In the Journal of the Agricultural Society of India appeared "The Subsianlik Tract, with special reference to the Bijnour Forest and its Trees" (vol. xiii., 1865); "Journal of a Botanising Tour in Hazara and Khagan" (vol. xiv., 1866); and "A Tour in the Punjab Salt Range" (vol. i., new series, 1867). His last communication, "Notes of a Botanical Tour in Ladak or Western Tibet," appeared in the Transactions of the Botanical Society of Edinburgh (vol. x., 1869). In addition to these and other papers in different journals and reviews, his official reports while at the head of the Forest Department in the Punjab contain the record of a large amount of accurate observations on the arborescent vegetation of that province; and in 1869, before coming home on furlough, he published a most useful work on the trees, shrubs, and herbaceous plants of economical value growing in the Punjab. This work, entitled "Punjab Plants," contains systematic and vernacular names and notes on the geographical distribution and uses of upwards of 800 species. In another respect also Dr. Stewart rendered great service to the cause of forest administration in India, for he commenced the large and now flourishing plantations in the plains of the Punjab. In 1869, after twelve years of unremitting labour, mental and bodily, Dr. Stewart returned to England, and the Government of India entrusted him with the preparation at Kew of a Forest Flora of Northern and Central India; and with a view to include the principal trees and shrubs of those districts which Dr. Stewart had not visited, a young forest officer, Mr. Richard Thompson, was at his suggestion deputed to collect plants and notes in Oudh and the Central Provinces. To this great work, which purposes to give an account of the natural history of the trees and principal shrubs and climbers in the forests, Dr. Stewart devoted a large part of his furlough, and he would doubtless have completed it in a satisfactory manner if his health had not given way. He was naturally of a highly nervous temperament, and during the latter part of his residence in England it was evident to his friends that his general health was much impaired. This was further apparent on his return to India, when, after a few months of office work, sickness obliged him to move (June, 1873) from Lahore to the Hill Sanitarium at Dalhousie, where he gradually sank from paralysis, on the 5th July, aged forty-one. Post-mortem examination revealed extensive tubercular deposit in the brain. He was kind and generous to all who required his help, and his loss is regretted by a large number of friends in India and in this country. Dr. Stewart was a member of numerous learned societies, and among others he was a Fellow of the Royal Society of Edinburgh, of the Royal Geographical, and the Linnean Society.

Mr. Elihu Hall, of Athens, Illinois, United States, has for disposal 6 sets of Texas Phanerogams, each containing on an average 830 species. Price 8 dollars, American currency, per 100 species.

Original Articles.

ON SOME LYCOPODIACEOUS PLANTS FROM THE OLD RED SANDSTONE OF THE NORTH OF SCOTLAND.

BY WM. CARRUTHERS, F.R.S.

(PLATE 137.)

THE precise horizon which should separate the Carboniferous formation from the Devonian is a subject which has been often discussed, and about which considerable differences of opinion have been entertained. On the one hand, some German geologists have included the lower rocks of the Carboniferous system in the Devonian period, and in this way Unger, Roemer, Göppert, and Schimper have apparently greatly increased the number of the plants of these older beds. On the other hand, the late Prof. Jukes proposed to exclude the Devonians of the South of England from the Old Red Sandstone series, and to consider them as only the equivalents of the lower Carboniferous strata of the South of Ireland. And Prof. Heer has gone further, for while Jukes held that the yellow sandstones formed the newest beds of the Old Red Sandstone, he has proposed to unite these yellow sandstones of Ireland and Britain with fossiliferous strata of the same age in Bear Island, and thus form a group, distinguished by the name of the Ursa stage, which he considers to be the fundamental series of the Carboniferous period. The animal remains found in some of the beds of the yellow sandstones, however, establish that these beds are of Devonian age, and there is, besides, nothing in the facies of the fossil plants found in them to require their being associated with the Carboniferous system.

From the Devonian system then I understand to be excluded the so-called transition rocks of the Continent, of which the most characteristic fossil is *Posidonomya*, and to be included the yellow sandstones of Ireland and Scotland, and the rocks containing similar fossils in Devonshire. In regard to the Devonian rocks proper, as they contain no plant remains it is little matter botanically whether we adopt the opinions advocated by the late Prof. Jukes, or follow the universally received opinion so ably defended by Mr. Etheridge in a review of the criticisms of Mr. Jukes, in his elaborate memoir on the physical structure of Somerset and Devon.

This limitation excludes from the Devonian strata all the Lycopodiaceæ described by Göppert in his "Flora Transitionis" (1852); by Roemer in his account of the Harz region (Meyer's "Palæontographica," 1854, vol. iii.); by the Sandbergers in their work on the geology of Nassau (1856); by Unger in his "Schiefer und Sandstein Flora" (Denkschrift. k. Akad. Wissensch. Vienna, 1856, vol. xi., p. 175); by Schimper in his Transition Rocks of the Vosges (1862); and by Göppert in his Review of the Flora of the Older Rocks (Nova Acta Acad. Leop., 1860, p. 425).

In the yellow sandstones of Great Britain and Ireland we have a species of Lycopod, and perhaps only one. Few plants have been the subject of so much observation or received so many names as this fossil. Edward Forbes first drew attention to it in 1852, when he shortly described the fossils found in these rocks in the South of Ireland, and characterised it as a species of *Lepidodendron*. During the twenty years that have since elapsed more than a dozen different names have been given to the stem of this fossil, the last being *Knorria Bailyana*, given by Schimper in his "Traité de Pal. Veg." (1870). The different parts also of the plant, the roots, the leaves, and the fruits, have each been referred to genera established for the reception of such fragments. This single species has thus secured an unusually large number of names even for a fossil plant.

The flora of the lower Devonian rocks is very little known. The different Continental authors have distinguished seven species, all of which have been referred to Algæ. These are :—

- 1852. *Halserites Dechenianus*, Göpp., *Flora Transitionis*, p. 88, pl. 2.
Confervites acicularis, Göpp., l.c., p. 80, pl. 41, f. 3.
Sphærococcites lichenoides, Göpp., l.c., p. 91., pl. 41, f. 2.
Drepanophycus spinæformis, Göpp., l.c., p. 92, pl. 41, f. 1.
- 1854. *Chondrites Andreæ*, Roem., Meyer, *Palæont.*, vol. iii., p. 70, pl. 2, f. 2.
- 1855. *Chondrites foliosus*, Eichw., *Leth. Ross.*, vol. i., p. 58, pl. 1., f. 4.
Caulerpites pennatus, Eichw., l.c., p. 47, pl. 1, f. 1.

The vegetation of the middle Devonians of the North of Scotland had not escaped the notice of Hugh Miller. In his "Old Red Sandstone," published in 1841, he figures and shortly describes several specimens. Six fragments are represented on plate vii. of that work, all of which he then thought were sea-weeds (p. 100). They are obviously portions of the plants to which Dr. Dawson long after gave the name *Psilophyton*. These plants were found in the Old Red Flagstones so extensively developed in Caithness, and which owe their dark colour to organic matter, mainly, as Hugh Miller suggested, of vegetable origin; so strongly bituminous are some of the beds of dingier tint that they flame in the fire like slates steeped in oil ("Testimony of the Rocks," p. 431). In addition to the specimens which he referred to Algæ, he detected others which exhibited roundish markings like those covering the surface of the *Stigmarias* of the Coal Measures.

In his second great work on the Old Red Sandstone of Scotland—"The *Asterolepis* of Stromness," 1849—Hugh Miller added considerably to our knowledge of the plants of these rocks, and figured several more perfect and instructive specimens. Perhaps the most important addition to the flora is that of a Conifer which he found in a nodule, and which Prof. McNab has recently described with greater precision, and named *Palæopitys Milleri* (*Trans. Edin. Bot. Soc.*, vol. x., p. 312; *Journ. Bot.*, vol. viii., p. 54). But of more interest in connection with our present subject are the accurate figures and descriptions of a plant from Orkney, which was also abundant in the

rocks at Thurso, and which from the remarkable difference in the aspect of its lower and upper portions he thus describes as two different plants:—

“The one an imperfectly preserved vegetable, more nearly resembling a Club-moss than aught else which I have seen, but which bore on its surface, instead of the well-marked scales of the *Lycopodiaceæ*, irregular rows of tubercles, that, when elongated in the profile, as sometimes happens, might be mistaken for minute, ill-defined leaves; the other, a smooth-stemmed fucoid, existing on the stone in most cases as a mere film, in which, however, thickly-set longitudinal fibres are occasionally traceable, and which may be always distinguished from the other by its sharp-edged outline.”—p. 186.

His drawings, the size of nature, of the sharp-edged finely-serrated weed, and that roughened by tubercles, are singularly accurate, and might have been made from either of the large specimens figured on my plate (pl. 137, figs. 3 and 4).

The “Testimony of the Rocks,” which was posthumously published in the beginning of 1857, includes a valuable exposition of the less-known fossil floras of Scotland, containing many important additions to knowledge which have not even yet got their place in the records of geological science. Miller here recognised the true affinity of the plant he had already figured in his “Old Red Sandstone” and his “*Asterolepis* of Stromness,” and gave a very characteristic woodcut of the lower portion of the stem, with its branches and foliage (figs. 12 and 120). He says:—

“We find the remains of a terrestrial plant allied to *Lepidodendron*, and which in size and general appearance not a little resembles one of our commonest Club-mosses, *Lycopodium clavatum*. It sends out its branches in exactly the same style—some short and simple, others branched like the parent stem—in an arrangement approximately alternate; and is everywhere covered, stem and branch, by thickly-set scale-like leaflets, that suddenly narrowing terminate in exceedingly slim points. It has, however, proportionally a stouter stem than *Lycopodium*; its leaves, when seen in profile, seem more rectilinear and thin; and none of its branches yet found bear the fructiferous stalk or spike.”—p. 432.

Mr. Salter in 1858 described and figured several plant remains from the Caithness flagstones (Quart. Journ. Geol. Soc., vol. xiv., p. 74, pl. 5). The Lycopodiaceous plant, which had been so frequently figured by Miller, he again figured and described under the name *Lepidodendron nothum* of Unger, but with a doubt as to its identity. The specimen figured is now in the Museum of Practical Geology, Jermyn Street, and the counterpart was acquired by the British Museum as a portion of the valuable collection of Old Red Sandstone plants belonging to the veteran naturalist, Mr. Peach. The fragmentary portion figured lies amid an abundance of the smooth dichotomously dividing branches described by Miller as fucoids, but really belonging to the same *Lepidodendroid* plant. These terminal dichotomous branches, as well as the lateral ones, are also figured by Salter, who supposed them to be the rootlets of Coniferous plants, the wood of which he had obtained from the same locality. A less perfect specimen of the same plant he figured (l.c., pl. 5, fig. 8) on a

reduced scale, and named *Lycopodites Milleri*, Salter. The size of the stem and the character of the foliage agree so exactly with Miller's figures and with the specimens I have examined, that I have no doubt as to its identity; but I have not seen the specimen itself, which Mr. Salter described as a fragment of which "not much can be said as to its structure."

In 1858 Mr. Salter included in a paper on the older rocks of the North of Scotland, by Sir R. I. Murchison, a drawing and description of a branching stem supposed to belong to a Fern, and named by him *Caulopteris* (?) *Peachii*, after its discoverer (Quart. Journ. Geol. Soc., vol. xv., p. 408).

Omitting from this record the notices in Murchison's "Siluria," which are substantially those published by Salter, and the references in general works on geology, these are the whole of the published accounts bearing on the *Lycopodiaceæ* of the Old Red Sandstones of the North of Scotland.

The communication of a remarkable and, as far as I know, unique specimen from the plant-bearing flagstones of Skail on the Mainland, Orkney, by Sir Ph. de M. Grey Egerton, Bart., has specially directed my attention to these plants. I have given a figure of this specimen on the plate (tab. 137, figs. 1 and 2), together with two singularly perfect stems from the collection of Mr. Peach, now in the British Museum. The larger of the two (fig. 4) is drawn half the size of nature, and shows the lower part of the stem with its clothing of leaves and its approximately alternate branches, organically connected with the dichotomously branching sharp-edged fucoid, which Miller supposed to be a different plant. This specimen further establishes that the fragments figured and described by Salter as Coniferous rootlets are the upper branches of his Lycopodiaceous plant *Lepidodendron nothum*, Salt. (non Ung.), and *Lycopodites Milleri*, Salt. The second specimen, drawn natural size at fig. 3, shows the same characteristics in the stem and its branches.

From the various drawings and descriptions published by Miller, one can see that this plant had stigmaroid roots, a slender Lycopod-like stem, with the lower branches short, simple, or compound, and with numerous short acuminate leaves, and with the upper branches regularly dichotomising, with sharp edges produced by the absence of distinct leaves, the ultimate divisions being short and slender, and sometimes rolled up in a circinnate manner at the tips. He also noticed the slender vascular axis running along the centre of the upper branches.

This plant, figured as a fucoid in 1841, is certainly the same as that to which Göppert in 1847 gave the name *Haliserites Dechenianus*, which he published without description or drawing (Leonhard and Bronn's "Jahrbuch," 1847, p. 686); but in 1852 he supplied these desiderata in his Transition Flora (p. 88, t. 2).

In 1859 Dr. Dawson published his first memoir on the Devonian plants of Canada (Quart. Journ. Geol. Soc., vol. xv., p. 477). Here he describes and figures a fragment of a Lycopodiaceous plant under the name *Lepidodendron Gaspianum* (l.c., vol. xv., p. 483, fig. 3; also vol. xviii. (1862), pl. xiv., figs. 26—28, and pl. xv., fig. 58), which agrees, as far as the descriptions and figures permit the comparison,

with those figured and described by Salter in the previous volume of the Journal, and by Miller in his various publications. I do not of course insist that it is the same species, only that Dr. Dawson has not supplied in any of his memoirs characters which justify his separating it as a distinct species from the previously described and figured fossil referred to *Lepidodendron*, from the Scottish beds.

In the same paper Dr. Dawson gives the generic name *Psilophyton* to some small Lycopodiaceous plants, from the same strata as his *Lepidodendron Gaspianum*; but as he has never given a diagnosis of the genus, I am unable to discover, in the published descriptions of the four species included in it, the points which he found them to possess in common, and which justified their being grouped in one genus. The species named *P. princeps* was apparently a humble Lycopod compared with those found in the upper Devonians and the Coal Measures. Its stem was covered below with numerous short rigid leaves spirally arranged, while the upper branches were almost if not altogether leafless, and repeatedly branched dichotomously, with the tips sometimes rolled up in a circinnate manner. The long, slender, simple leaf-bearing branches of this Canadian plant indicate a different species from the Scottish plant, but in other respects the plants agree. And in their vegetative characters as well as in their size they agree with several living *Lycopodia*. Thus *Lycopodium densum* from Tasmania has an erect stem with short lateral branches, which ultimately divide in a dichotomous manner. This is the character also of the European *L. complanatum*, of the widely-distributed *L. cernuum*, and of many others. The paucity and in some cases almost absence of leaves from the fruit-bearing branches of those species which have their fruit in stalked cones is familiar in many species as in the common *L. clavatum*. The ultimate divisions of *L. casuarinoides* from the Malaccas are long, linear, smooth-sided, and almost leafless, like the upper divisions of *Psilophyton*. The character of the fruit is, however, very different from any known in the Order. If this peculiar fruit character were common to all the species included under *Psilophyton*, no better generic distinction could be found; but while a fair amount of agreement exists in the descriptions of the sporangia of *P. princeps* and *P. robustius*, though in the first they terminate the axis of the ultimate branches, while in the second species there appear to be bracts as well as sporangia, it is very different in *P. elegans*, the fructification of which is said to occur "in groups of small, broadly oval scales, borne on the main stem below the points of bifurcation." I do not profess to understand this description, but whatever it means, it is obviously very different from what is known in the other two. I have seen no satisfactory remains of fructification in any British specimen, but the specimens of *P. princeps* presented by Dr. Dawson to the British Museum fully substantiate the accuracy of his description of the fruits of that species.

The genus may be thus characterised:—

Psilophyton, Dawson. Sporangia oval, naked, opening by a lateral slit, borne in pairs at the termination of the ultimate branches; stem erect, low (probably from 2 to 4 feet high), springing from a creeping rootstock (or from stigmaroid roots?), branching irregularly below, and dichotomously above; leaves lanceolate, acute,

densely covering the stem and lower branches, few or entirely absent on the upper branches.

The only British species may be thus characterised :—

Psilophyton Dechenianum, Carr. Lower branches short and frequently branching, giving the plant an oblong circumscription.

1841.—“Fucoid,” Hugh Miller.

1847.—*Halserites Dechenianus*, Göpp.

1857.—*Lepidodendron nothum*, Salter (non Ung.).

Lycopodites Milleri, Salter.

I have referred to Salter's *Caulopteris* (?) *Peachii*: the examination of the original specimen, which is at Jermyn Street Museum, inclines me to believe that it may be the fragment of a large plant allied to *P. robustius* of Dawson, with which it agrees in the external aspect of the stem and in the manner of branching.

The interesting specimen communicated by Sir Philip Egerton consists of a dichotomously dividing stem, nearly uniform in diameter in its different parts, and densely covered with small lanceolate acute leaves. On the right of the specimen a compound structure is preserved, the nature of which is not easy to determine. It appears to be broken from the branch immediately below it. The body itself looks like a compound spike. From the opposite sides of the stalk spring several erecto-patent, at length incurved, leaf-like bodies. They were obviously arranged spirally on the main axis, their opposite appearance being due to the manner in which the fossil is preserved. Scattered among them are a large quantity of linear organisms, about a quarter of an inch long, which are all arranged round special centres, just as the much longer leaves of the Larch are arranged around the short branches which support them. These centres are short thickened processes on the main axis, or on the curved leaf-like bodies. About halfway up the inner curve of the lowest of these such a process is shown with the linear bodies radiating from it. A large number of such cushions exist, scattered apparently without order on both the main axis and the lanceolate branches, for though leaf-like they can be of course neither leaves nor bracts. The whole head must have been a somewhat compact structure, showing externally the lanceolate incurved branches partly enclosing the numerous masses of small linear bodies.

I can see no intelligent interpretation of this interesting specimen. The linear bodies are too unlike the leaves to suppose this to be a mass of undeveloped leaf-buds. Nor are they like organs of reproduction, although it is more probable this may be their nature. They suggest the two fossils described by Dr. Dawson under the names *Antholithes devonicus* and *A. floridus* (Pre-Carb. Floras, p. 63, pl. xix, figs. 235, 236); but it is far from likely that the linear bodies can be stamens or pistils either in this or in the Canadian specimens, as stated by Dr. Dawson.

Though unable to offer any interpretation of this curious fossil, I have yet figured it, as any addition to so ancient and little known a flora as that of the Caithness flagstones of middle Old Red Sandstone age is important, and this notice and figure may secure further

materials for an intelligent estimate of its nature. I leave the name to be given when this is done, being greatly adverse to the too common practice of publishing names for imperfect and unexplained fossils.

EXPLANATION OF PLATE 137.

Figs. 1 and 2. Specimen from the Old Red Flagstones of Skail, Orkney. The two figures belong to the same specimen, but it was not practicable to show them in the plate on the one slab; the natural relation is, however, shown by the small fragment of the stalk of the compound structure on the right side of fig. 1, and by the upper portion of the double branch in fig. 2.

Fig. 3. Specimen of *Psilophyton Dechenianum*, Carr., found at Sheep Skerry, in the island of Stroma, off the north coast of Caithness, by Mr. C. W. Peach.

Fig. 4. Specimen of the same (half the size of nature), from Cullygoe, in the same island; also from the collection of Mr. Peach. Both specimens are now in the British Museum.

ON THE MOSSES OF THE WEST RIDING OF THE COUNTY OF YORK.

BY C. P. HOBKIRK.

(Read at the Meeting of the British Association, Sept. 18th, 1873.)

IN offering this short *resumé* of the Moss Flora of the West Riding, at the request of Prof. Lawson, and as a small contribution towards the flora of my own division of the county, I would have it understood that it is merely a sketch of what is at present known and recorded on the subject. Although several rare species are to be found in various parts of the Riding, and certain districts have been well and thoroughly worked up, yet there are other districts which are almost virgin ground to the bryologist, and I have no doubt that many more of our rarer species will yet reward the searcher in many of the unworked nooks and corners of the county. The district around Todmorden has been one of the best explored, chiefly owing to the indefatigable labours of my late friend, Mr. John Nowell, of that town, with whom I have made several excursions over his favourite haunts. His researches were not, however, confined to his own immediate neighbourhood, but extended into the districts of Malham, Clapham, Bolton Woods, Ingleton, and Heptonstall, and his authority is the one from which most if not all the species of these districts are inserted in the following list. Amongst the other explorers of these rich districts, to whom we owe much of our knowledge, may be mentioned Mr. S. Gibson, R. Spruce, J. G. Baker, and Louis C. Miall along with Dr. Carrington. The north-western portion of the Riding has thus been well worked by these gentlemen, whilst the south-eastern portion southwards from the rivers Calder and Aire, including the valley of the Don and the Dearn, the moorlands south of Penistone, and all the districts around Barnsley, Askern, Thorne, Doncaster, Goole, Mexbro', Rotherham, and Sheffield, are almost unexplored in a bryological sense, or at any rate, if partially explored, the results are unpublished in any form.

The West Riding may be divided into eight riversheds, viz., the Lune, Ribble, Upper Aire, Lower Aire, Wharfe, Nidd, Colne and

Calder, and the Don. Of these, the first, second, fifth, and seventh are pretty well explored, and the list of species at the end of this sketch is chiefly made up of the forms found in these districts. By far the richest rivershed is that of the Wharfe, commencing on the high moorlands above Kettlewell, Malham, and Burnsall, and including the deep productive woods around Barden Tower, Bolton Abbey, Harewood, Otley, and Cottingham. Airedale and Ribblesdale also produce many and rare species, from Yeadon, Bingley, Skipton, Clapham, Ingleton, and Giggleswick. As usual, the limestone and Silurian formations are richest both in number of species and in profusion of specimens; whilst, when we come down to the Carboniferous sandstones and shales, in the country immediately surrounding Bradford, Leeds, Halifax, and Huddersfield, we find a great falling off in this respect. The millstone grits forming the highlands from which the Colne and Calder take their rise occupy an intermediate position, and produce some rare subalpine species, amongst which may be mentioned the minute *Brachyodus trichodes*, growing in a cleft of rock at Holme Moss, at an elevation of 1500 feet above the sea-level.

Of the 561 species now ascertained to be found in the British Islands, the West Riding possesses close upon 300, and I have no doubt that a careful search in the less explored districts of the south would materially increase the number. Of these Todmorden alone can furnish 120, and Bolton Woods quite as many. These 300 species are grouped into 69 genera, whilst about 20 genera are altogether absent. Of the 14 species of *Sphagnum* we have 12. All the *Phascums* have been found; 14 sp. of *Dicranum*; 17 of *Tortula*; 17 of *Orthotrichum*; 5 of *Polytrichum*; 23 of *Bryum*; 10 of *Mnium*; 7 of *Bartramia*; 8 of *Fissidens*; 7 of *Leskea*; and 71 of *Hypnum*. The unrepresented genera are *Cynodontium*, *Stylostegium*, *Hedwigidium*, *Glyphomitrium*, *Cedipodium*, *Dissodon*, *Tayloria*, *Tetraplodon*, *Meesia*, *Aulacomnion*, *Timmia*, *Oligotrichum*, *Dichylema*, *Leptodon*, and *Daltonia*.

In range of altitude the West Riding gradually rises from the level of the sea on the east, with occasional depressions, to the longitude of Leeds and Dewsbury, about $1^{\circ} 38' W.$, from whence to the west and south-west it rises rapidly, beyond Hebden Bridge, Huddersfield, and Penistone, into high flat ridges, often covered with peat bogs, and ranging from 1500 to 1800 feet; whilst to the north-west these lower hills gradually increase in height along the borders of Yorkshire and Lancashire, until they reach their greatest elevation in Whernside, 2245 ft.; Penyghent, 2273 ft.; and Ingleboro', 2373 ft. On these ranges we get many subalpine species, such as *Andreaea petrophila* and *alpina*, *Sphagnum tenellum* and *rubellum*, *Brachyodus trichodes*, *Encalypta ciliata*, *Grimmia funalis*, *Orthotrichum rupestre*, *Zygodon Mougeottii*, *Bryum julaceum*, *Cinclidium stygium*, *Bartramia ithyphylla* and *arcuata*, *Splachnum sphaericum*, *Tetraplodon mnioides*, *Climacium dendroides*, *Myurella julacea*, and several *Hypna*.

Of the new species found since the publication of Wilson's "Bryologia" a few words may suffice. *Sphagnum papillosum*, Lindb., separated from *S. cymbifolium* by its more papillose and boat-shaped leaves, has not been found in the West Riding; but I have little doubt

that before long we shall find that form, as I am informed that it is as frequent as *cymbifolium* in other localities where that species is found.

Fissidens exilis has been found at Todmorden, as also *Tortula vinealis*, and it is probable that others may yet turn up. *Atrichum crispum* (James) (*laxifolium*, Wils. MS.) has been found both at Saddleworth and Todmorden.

Of the new division of the *adunca* group of *Hypnum* we have as yet found only the typical form *H. aduncum* of L. & Dill. (*H. exannulatum*, Gümbl.); but I have little doubt that most if not all the others will yet be found. The species which has generally been distributed under the name of *H. aduncum*, L., is really only a small form of *H. Kneiffii*; whilst, according to the most recent researches of Dr. Braithwaite, who some months ago examined the original specimen of Dillenius on which the species was founded, the typical form is the one named afterwards *exannulatum* by Gümbl.; consequently this name must now sink to the rank of a synonym, and the original name *aduncum* be retained. This species differs from *Kneiffii* by its much more falcate leaves, which are striate, rather strongly nerved nearly to the apex, with the basal cells larger and inflated, and gradually passing into the long narrower ones above; whilst *Kneiffii* has more distant and less crowded leaves, only slightly falcato-secund, not striate, only thinly nerved for about two-thirds their length, with the basal angles decurrent excavate, of lax subquadrate cells, those above being elongate rectangular. The other species of this group are *H. Sendtneri*, Sch., which is var. ϵ . *hamatum* of *H. aduncum* of Bry. Eur., with its var. β . *Wilsoni*; *H. vernicosum*, Lindb. = *H. pellucidum*, Wils. MS., and *H. aduncum*, var. *tenuis*, of Bry. Brit., and *H. intermedium*, Lindb. = *H. Cossoni*, Schp.

These forms are all sufficiently distinct to rank as true species, and a little study of the various forms will soon enable any bryologist to distinguish them readily.

[N.B. The sign (!) after any locality signifies that I have seen authentic specimens from thence; the sign (!!) that I have specimens in my herbarium from that locality.]

1. *Andreæa petrophila*, Ehr. Ingleboro', Brimham rocks.
2. *A. alpina*, Turn. Wet rocks Ingleboro', Brimham.
3. *A. rupestris*, Turn. Cliviger, Todmorden! Wharfedale, Ingleboro'.
4. *Sphagnum cymbifolium*, Ehr. Stansfield Moor Todmorden! &c.; frequent.
5. *S. compactum*, Brid. Stansfield Moor, Whernside.
6. *S. tenellum*, Ehr. Swaledale! Ingleboro', Stansfield Moor.
7. *S. rubellum*, Wils. Ingleboro', Stansfield Moor, and Rombalds Moor.
8. *S. acutifolium*, Ehr. Stansfield Moor!
9. *S. fimbriatum*, Wils. Stansfield Moor.
10. *S. cuspidatum*, Ehr. Malham Moor, Ilkley.
11. *S. contortum*, Schulz. Ramsden Clough!! and Stansfield Moor Todmorden.
12. *S. squarrosum*, Pers. Frequent.
13. *Archidium phascoides*, Brid. Todmorden!

14. *Phascum serratum*, *Schr.* Hareley Wood, Todmorden.
15. *P. muticum*, *Schr.* Esholt, Ilkley, Stoneyroyd, near Todmorden.
16. *P. rectum*, *Sm.* Pontefract! Todmorden!! Esholt, Rawden, Ripon.
17. *P. curviculum*, *Hed.* Pontefract and Castleford.
18. *P. cuspidatum*, *Schreb.* Rawden, Bolton, Ripon, Ackworth.
19. *P. bryoides*, *Dicks.* Ripon, moors near Huddersfield.
20. *P. nitidum*, *Hed.* Yeadon Moor.
21. *P. subulatum*, *L.* Not uncommon; Ripon, &c.
22. *P. alternifolium*, *B. & S.* Wessenden, near Huddersfield!! Bolton Abbey.
23. *Gymnostomum tenue*, *Schrad.* Thorparch, Fountains Abbey.
24. *G. rupestre*, *Schw.* Ramsden Clough, Todmorden! Bingley, Bolton, Malham.
25. *G. microstomum*, *Hed.* Todmorden! Malham Cove, Heptonstall.
26. *Weissia controversa*, *Hed.* Todmorden! Ripon, &c.; frequent.
27. *W. cirrhata*, *Hed.* Todmorden! Storthes Hall, near Huddersfield!! Rawden, Bolton Woods, Pateley Bridge.
28. *W. verticillata*, *Brid.* Bolton Abbey, Knaresboro', Wentvale, Helks' Wood, Ingleton, Gordale.
29. *Rhabdoweissia fugax*, *B. & S.* Between Bolton Abbey and Barden Tower, Ingleboro'.
30. *R. denticulata*, *B. & S.* Greensclough, Todmorden!
31. *Campytostelium saxicola*, *B. & S.* Ramsden Clough, Todmorden!
32. *Brachyodus trichodes*, *N. & H.* Todmorden! Holme Moss!!
33. *Seligeria recurvata*, *B. & S.* Stream from Clapham Cove, Strid Bolton, Todmorden!
34. *S. pusilla*, *B. & S.* Malham Cove, Ingleboro', Howgill and Dent Fells.
35. *Anodus Donianus*, *B. & S.* Heptonstall!
36. *Blindia acuta*, *B. & S.* Cliviger, Todmorden!
37. *Dicranum pellucidum*, *Hed.* Todmorden! Ripon! Idle, Rombalds Moor, Gordale, Bolton.
38. *D. Schreberi*, *Hed.* Langfield Moor, Todmorden!!
39. *D. squarrosum*, *Schrad.* Todmorden!! Bolton, Halifax.
40. *D. cerviculatum*, *Hed.* Ramsden Clough!! Walsden!! Headingley, Rombalds Moor.
41. *D. varium*, *Hed.* Not unfrequent.
42. *D. rufescens*, *Turn.* Not uncommon, Esholt, Idle.
43. *D. subulatum*, *Hed.* Todmorden!! Hebden Valley!!
44. *D. heteromallum*, *Hed.* Common.
45. *D. Scottianum*, *Turn.* Idle Wood.
46. *D. fuscescens*, *Turn.* Bingley, Bolton, Heptonstall, Malham.
47. *D. scoparium*, *Hed.* Common.
48. *D. majus*, *Turn.* Bingley Woods! Bolton, Harewood, Clapdale.
49. *D. palustre*, *Brid.* Castle Howard! Rombalds Moor, Todmorden.

50. *D. spurium*, *Hed.* Pilmoor!, near Ripon.
51. *Leucobryum glaucum*, *Hampe.* Heptonstall! Dungeon Wood, Huddersfield!!
52. *Ceratodon purpureus*, *Brid.* Todmorden! Marsden Clough!!
53. *Campylopus atrovirens*, *De Not.* (longipilus, p. parte). Austwick.
54. *C. flexuosus*, *Brid.* Heptonstall! Idle, Rawden, Bingley, Ilkley.
55. *C. fragilis*, *B. & S.* Todmorden, Otley Chevin.— β . *densus*, Malham.
56. *C. pyriformis*, *Brid.* Todmorden! Meanwood, Headingley.
57. *Pottia minutula*, *B. & S.* Pontefract, Rawden, Apperley, Tadcaster, &c.
58. *P. truncatula*, *L.* Common.
59. *P. Heimii*, *B. & S.* Thorparch.
60. *Anacalypta lanceolata*, *Röhl.* Pontefract! Bolton, Skipton, Ackworth, &c.
61. *Distichium capillaceum*, *B. & S.* Malham! Bolton, Ilkley, Ingleboro'.
62. *Didymodon rubellus*, *B. & S.* Todmorden!
63. *Trichostomum tophaceum*, *Brid.* Ramsden Clough, Todmorden! Gordale, Otley.
64. *T. flexicaule*, *B. & S.* Grassington!
65. *T. homomallum*, *B. & S.* Todmorden! Hebden Valley!! Wessenden!!
66. *Tortula stellata*, *Schreb.* (rigida). Pontefract! Castleford, Ripon, &c.
67. *T. ambigua*, *B. & S.* Pontefract, Knottingley, Castleford.
68. *T. aloides*, *B. & S.* Hovingham! Ingleboro', Settle, Ripley, Wenthill.
69. *T. lamellata*, *Lindb.* (*Pottia cavifolia*, var. *gracilis*). Pontefract! Ackworth.
70. *T. muralis*, *Timm.* Common.
71. *T. unguiculata*, *Hed.* Common.
72. *T. convoluta*, *Hed.* Todmorden, Ingleton.
73. *T. vinealis*, *Brid.* R. Ribble, at Horton, Bolton Bridge, Ingleboro', Ilkley.
74. *T. rigidula*, *Hed.* Bolton Woods, Gordale, Helks' Wood.
75. *T. fallax*, *Hed.* Frequent.
76. *T. recurvifolia*, *Mitt.* Malham, Ingleboro'.
77. *T. ruralis*, *Hed.* Walls, Malham! Bolton, Skipton, Settle.
78. *T. lævipila*, *B. & S.* Harewood, Ilkley, Bolton, Malham.
79. *T. papillosa*, *Wils.* Bolton, Ilkley, Harewood.
80. *T. latifolia*, *B. & S.* Wharfe, near Tadcaster.
81. *T. subulata*, *Brid.* Frequent.
82. *T. tortuosa*, *W. & M.* Ilkley, Malham, Ingleboro'.
83. *Cinclidotus fontinaloides*, *P.B.* R. Wharfe, R. Yore, Malham.
84. *Encalypta vulgaris*, *Hed.* Malham.
85. *E. ciliata*, *Hed.* Malham!! Gordale, Ingleboro', Whernside.
86. *E. rhabdocarpa*, *Schw.* Ingleboro'.
87. *E. streptocarpa*, *Hed.* Grassington! Malham, Bolton, &c.

(To be continued.)

DESCRIPTIONS OF SOME NEW SPECIES, SUBSPECIES,
AND VARIETIES OF PLANTS COLLECTED IN MOROCCO
BY J. D. HOOKER, G. MAW, AND J. BALL.

By J. BALL, F.R.S.

(Continued from page 307.)

Vicia glauca, Psl.; var. *rerayensis*, nob.—Primo intuitu a typo non differt nisi floribus minoribus pallide lilacinis, carina apice atropurpurea. Notas differentiales graviores video in calyce valde inæquali, dentibus inferioribus subulatis tubo longioribus, superioribus vix tubum dimidium æquantibus.—*Hab.* In regione superiori Atlantis Majoris. In convalle Ait Mesan! a 2400^m ad 2600^m.

Legumen immaturum pilosiusculum. In spec. ex Sicilia et Algeria video suturam leguminis pilosam.

Lathyrus fissus, nob.—Annuus, nanus, caule debili ramoso, 4-angulato; folia 2-3 juga, cirro simplici munita; stipulæ foliola dimidium longæ, semisagittatæ; pedunculi uniflori, aristati, foliis æquilongi; calycis dentes subulati, subæquales, tubo 4-5 longiores; flores parvi (jam emarcidi videntur rubelli); legumen disper-mum, breviter stipitatum, ovatum, acutum, apice obliquo sub-ros-tratum.—*Hab.* Ad radices Atlantis Majoris—in rupibus apricis supra Seksaoua!

Huic similis sed non affinis est *L. ciliatus*, Guss. = *Orobis saxatilis*, Vent. et DC. Fl. Fr. In hoc calyx et legumen omnino diversi.

Rubus (§ *Dalibarda*?) *debilis*, nob.—Prostratus, ramosissimus, ramis debilibus; folia ovalia crenata, utrinque viridia, integra vel basi lobata, vel ternata foliolis lateralibus petiolulatis lobo terminali multo minoribus; stipulæ filiformes; flores in spec. nostris emarcidi, achenia (infertilia) omnino sicca apice acuta stylo caduco.—*Hab.* Ad radices Atlantis Majoris. Legimus in convalle Ourika! circa 1100^m.

Genus Linneanum *Dalibarda* a celeb. Benth. & Hook. ad sectionem *Rubi* reductum in America boreali, et meridionali (ad fretum Magellanicum) et Nepalia detectum, etiam Africæ boreali, ut videtur, indigenum est; sed specimina nostra manca observatione ulteriori in loco natali carent.

Poterium anceps, nob.—Multicaule, foliaceum; folia primaria radicalia in pagina inferiori, caulina utrinque sericeo-villosa; capitula rotundata; achenia pulverulento-tomentosa, compressa, ancipitia, ad angulos laterales alata, ad anteriorem et posteriorem, alæ subobsoletæ vix prominentes.—*Hab.* In regione superiori Atlantis Majoris—Ait Mesan! et in monte Djebel Tezah! circa 2500^m.

Invito animo novam proposui speciem in hoc genere speciebus incertis nimis onusto; sed achenia in speciminibus ab omnibus mihi cognitis omnino diversa.

Cotyledon hispanica, DC. (sub *Pistorinia*); subsp. *C. Cossoniana*, nob.: *Pistorinia breviflora*, Coss. (Cat. Pl. Marocc. mss.), non Boiss. El. —Differt a *C. hispanica*, planta polymorpha a nobis diu observata—cujus varietates sunt *Pistorinia Salzmanni*, Boiss. Voy. en Esp., pl. 63, B.—*P. breviflora*, Boiss. El., et *P. intermedia*, Boiss et Reut., corolla

multo breviori, fere ad medium tubi fissa, pallide erubescenti, lobis lanceolatis mucronatis, calycis segmentis longioribus corolla quartam partem æquantibus, statura minore. Haberem pro specie probe distincta at vereor ne transeat in typum. Specimina ad Oued Sidi el Kebir prope Blidah in Algeria lecta a clar. Cosson *P. Salzmanni* nominata nostra sp. maroccana propria videntur.—*Hab.* In provinciis occidentalibus Imp. Maroccani. Legimus prope Casa Blanca! Mazagan! ad Ain el Hadjar, haud procul Mogador! et in Prov. Shedma!

Sedum modestum, nob.—Annuum, nanum; caulis inferne nudus, glaberrimus; folia pauca, plana, late spathulata, approximata, glaberrima; rami florigeri axillares et terminales, hirtuli; cyma depauperata, subaphylla; flores heptameri; sepala cum pedicellis ex pilis simplicibus hirtula, ad medium usque coalita; petala oblongo-lanceolata, acuminata, pallide alborubentia, nervo prominulo dorso pilifero sæpius apiculata; semina minutissima.—*Hab.* In fissuris saxorum et sub radicibus arborum in regione inferiori et media Atlantis Majoris. Legimus in convallibus Ourika! et Ait Mesan! et in monte Djebel Tezah! a 1100^m ad 1900^m.

Species distinctissima cui proximum, sed longo intervallo, foret *S. alsinifolium*, All.

Sempervivum tectorum, L.; subsp. (?) *S. atlanticum*, nob. (Bot. Mag., t. 6055)—Differt a typo notis sequentibus—folia rosularum obovato-oblonga, apice breviter mucronata, utrinque (in planta spontanea) breviter glanduloso-pubescentia, margine ciliata; folia caulina lanceolato-oblonga, superiora glanduloso-pubescentia; calyx fere ad basin fissus, stamina omnia perfecta, virginea obscure viridia (nec rubella); squamæ hypogynæ minutissimæ glandulosæ; carpella divergentia basi toro elevato suffulta, et a verticillis exterioribus squamis exceptis omnino discreta, staminibus æqualia petala $\frac{2}{3}$ longa.—*Hab.* Rosulas foliorum legimus in convalle Ait Mesan, anno 1871; ex his post annos ii. caules floriferi in Horto Kewensi enati sunt.

In tanta copia formarum pro speciebus novis a botanicis hodiernis et imprimis a clar. Jordan descriptarum notæ differentiales plane evadunt. Inter tabulas Jordanianas nullam video plantæ nostræ omnino conformem, et invito animo nomen novum proposui.

Monanthes atlantica, nob.—*M. muralis*, H.f., in Bot. Mag., ser. iii., No. 333, tab. 5988. Non *Petrophytes muralis*, Webb in Bourgeau Pl. Canar., No. 269 et 1284, nec C. Bolle in Bonplandia vii., p. 244.—*Hab.* In regione superiori Atlantis Minoris. Legi in monte Djebel Tezah alt. circa 2400^m loco uliginoso juxta nives deliquescentes.

Pace amici celeberrimi stirpem nostram cum planta Canariensi supra memorata in unam speciem confundere nequeo. Ratio partium floralium est omnino diversa; calyx brevior dentibus triangularibus, petala late ovato-acuminata, nec lineari-lanceolata ("linearia," Bolle l.c.), calycem duplo superantia, nec paulo longiora, squamæ perigynæ (staminodia) parvula, una basi carpellorum adhærentia et ter breviora nec magna, margine imbricata, carpellis paulo breviora ("coronam conspicuam laxam formantia," Bolle l.c.); stamina longiora petalis opposita, calyce duplo longiora sunt, et petalis subæqualia, series altera petalis alterna fit demum subæquilonga (ut videtur in tabula

Webbiana *Petrophytes agriostaphis*, Phyt. Canar., tab. 36, C); carpella denique omnino *nitida*, nec *undique papillosa*, latiora sunt et apice stylifero demum divaricata. His addas characteres levioris momenti—flores pentameri vel rarius hexameri, folia in ramis florigeris sparsa, et in planta spontanea tantum basi rosulata, calyx semper *glaberrimus* nec glandulis rubris hirtus, pedicelli subglaberrimi sed interdum pilis paucis glandulosis adpersi.

Propior erit *P. agriostaphis*, Webb, et forsan *P. tilophila*, Bolle (nomen barbarum!), species montanæ, sed ambæ a nostra satis superque diversæ. De speciebus Canariensibus quorum 5 jam descripsit beatus P. B. Webb, et 4 addidit clar. C. Bolle, judicent qui eas in loco natali vivas videbunt. In sicco extricatu nimis difficiles sunt. In planta nostra ovula pauca adscendentia versus basin folliculæ ad suturam ventralem affixa sunt, ut jam innotuit celeb. J. D. Hooker loco citato. Si eadem se habet structura in sp. affinibus foret character genericus non parvi momenti.

Tabula Fitchiana in Bot. Mag., l.c., mendis nonnullis non caret; stamina longiora petalis alternantia nec opposita, et nimis brevia ostendit: folia caulina (in planta spontanea) longiora sunt et basin versus attenuata, carpella matura in vivo sunt magis inflata nec superne sub stylo sensim attenuata.

Eryngium dichotomum, Dsf. Fl. Atl., tab. 85.; var. *ficariaefolium*, nob.—Differt a typo foliis primariis inermibus oblongo-orbicularibus basi profunde cordatis inciso-crenatis, caulinis minus tenuiter sectis, capitulis minoribus, involucri segmentis angustis fere semper inermibus.—*Hab.* In regione media Atlantis Majoris. Legimus folia novella cum caulibus subemarcidis anni prioris in convalle Ait Mesan, circa 1800^m.

Folia inermia sæpe bicoloria saturate viridia, Eryngii nil habent.

Eryngium Bourgati, Gouan; var. *atlanticum*, nob.—Differt a typo habitu graciliori, capitulis minoribus, involucri phyllis longioribus parce spinosis.—*Hab.* In regione superiori Atlantis Majoris. In monte Djebel Tezah circa 2400^m.

Galium sylvestre, Poll.; subsp. *G. atlanticum*, nob.—A grege *G. sylvestris* differt imprimis foliis surculorum sterilium et caulinis inferioribus abbreviatus obovato-acuminatis longiuscule mucronatis, interdum in pagina superiori scabris margine aculeolatis. Corolla parva gaudet segmentis acutis antheræ ochroleucæ. Panicula cymiformis trichotomo-cymosa. Planta pumila, 3-4-pollicaris laxè cæspitosa.—*Hab.* In regione superiori Atlantis Majoris. Legi in jugo Tagherot! circa 2700^m.

In tanta copia Galiorum e grege *G. sylvestris* nullum mihi cognitum est nostro conforme; ulterius observatum melius judicabitur.

Galium acuminatum, nob.—Radix lignosa, e collo ramosissima; caules ad angulos scabri, ex pilis brevibus patentibus vel subretrorsis; folia sena, lineari-lanceolata, nitida, subcoriacea, nervo medio basin versus conspicuo, margine aculeata, in mucronem longum acuminata; panicula racemiformis, scil. rami laterales brevissimi trichotomi, interdum ad pedicellos 3 reducti, ex axillis foliorum superiorum 2-3 enati; corolla ochroleuca, segmentis obscure trinerviis, in vivo apiculatis, fructus (immaturus) verosimiliter demum granulatus.—*Hab.* In

regione media et inferiori Atlantis Majoris. Distr. Reraya! In convalle Ait Mesan! a 1200^m ad 2100^m.

Species ab omnibus mihi cognitis probe distincta. Spec. exsiccata ad *G. pulvinatum*, Boiss., accedunt sed inflorescentia, et foliis longe mucronatis omnino diversa sunt. Fallor propius erit *G. brunneum*, Munby, sed ni fallor vera affinitas in sectione *Euaparine*, DC., cujus species omnes annuæ. In apricis planta nostra fit contracta, foliis approximatis caulibus 2-4-pollicaribus; in umbrosis occurrit habitu laxiori, caule usque pedem longo, foliis obverse lanceolatis verticillis remotiusculis. Herba obscure virens, exsiccata nigrescit.

Galium Bourgæanum, Coss.; var. *maroccanum*, nob.—Radix lignosa, elongata, inter fissuras rupium serpens; caulis, cum foliis inferioribus obtusis, undique hirtus; folia elliptico-vel obovato-lanceolata, in verticillo 6-9, superiora apice mucronata glabrescentia tenuiter ciliolata; panicula multiflora, ramosa, pyramidata; corollæ segmenta albovirentia, in sicco nigrescentia insigniter trinervia, acuminata, extus pilosa; fructus glaber.—*Hab.* Sat frequens in rupibus prov. meridionalium Imper. Maroccani, præsertim ad radices Atlantis Majoris. Prope Seksaoua! Milhain! Mtouga! Mskala!

Galium Bourgæanum, Coss., est species mihi non satis nota. Vidi tantum specimina "ex rupibus prope Tlemcen," in Bourgeau Pl. d'Algérie, 1856, No. 107. Planta nostra differt corolla virescente, insigniter trinervia nec alba subnervia, foliis superioribus viridibus glabrescentibus nec omnibus hirtis.

A proximo *G. viridifloro*, Boiss. et *G. maritimo*, L., differt fructu glabro, nec hispido, cæterisque notis.

Galium Noli-tangere, nob.—Radix lignosa, caules herbacei, cum foliis et pedicellis fragillimi, pilis rigidiusculis basi callosis vestiti; folia cruciata, ovalia, utrinque acuta, brevissime mucronata; inflorescentia depauperata; pedicelli pauci trichotomi terminales et axillares in verticellis superioribus; corolla alba; ovarium apice emarginatum papilloso-setosum.—*Hab.* In regione media Atlantis Majoris. In convalle Amsmiz! a 1500^m ad 1600^m.

Proximum est sed probe distinctum *G. musciforme*, Boiss. Diagn. Pl. Or.; differt a nostro imprimis corolla rubra, pedunculis bracteatis, supremis solitariis, inferioribus a 3- ad 7-floris.

(To be continued)

NEW BRITISH FUNGI.

By WORTHINGTON G. SMITH, F.L.S., &c.

1. *Agaricus (Lepiota) granulatus*, Batsch., var. *Carcharius*, Fr. Ep., p. 18, = var "c"—*incarnato-albida*, Mon. Hym. Sueciæ, p. 29.—On grass under old Scotch Firs, Largo, Fifeshire.
2. *Agaricus (Clitocybe) gangrænosus*, Fr. Epic., p. 56.—A remark-

able plant, which at length turns jet black.—Street, Somerset; J. A. Clark.

3. *AGARICUS* (*CLITOCYBE*) *SUBINVOLUTUS*, *nov. sp.*—Pileus plane, fleshy, margin subinvolute; gills broad, decurrent; stem stuffed, sub-bulbous; whole plant cream-coloured, every part at length becoming spotted.

Mr. Berkeley agrees with me in considering this a good species, and by no means a mere variety of *A. geotrupus*, Fr. Epic., p. 70. Our plant is always much smaller, with a stem one-third the length of *A. geotrupus*; it is moreover never umbonate, and the fruit of the two species is different.

4. *Agaricus* (*Clitocybe*) *Tuba*.—Fr. Epic., p. 72.—Epping Forest.

5. *Agaricus* (*Tricholoma*) *macrocephalus*, Schulzer, Icones Selectæ Hymenomycetum Hungariæ, tab. iii.—A remarkable addition to our flora. Odour very powerful, like *Lilium auratum*; stem long, subterranean.—King's Lynn; C. B. Plowright.

6. *Agaricus* (*Omphalia*) *Fibula*, Bull., var. *Swartzii*, Mon. Hym. Sueciæ, vol. i., p. 193.—Crystal Palace Grounds and elsewhere.

7. *Agaricus* (*Pholiota*) *Arrhenii*, Fr. Epic., p. 161.—A totally different plant from *A. mycenoides*.—In a wood-yard, amongst chips, North Wootton, Norfolk; C. B. Plowright.

8. *Agaricus* (*Flammula*) *astragalinus*, Fr. Epic., p. 187.—On Pine stumps, Aviemore, N.B., not common; Rev. Jas. Keith.—Taste nauseous and disagreeable like *A. melleus*; odour strong, unpleasant. A most beautiful species, resembling in its brilliant colouring *Cortinarius cinnabarinus*, Fr.

9. *AGARICUS* (*FLAMMULA*) *INAURATUS*, *nov. sp.*—Pileus fleshy, one inch or more across, moist, smooth, furnished with a distinct veil; gills broad, adnate, with a decurrent tooth, pale yellowish clay colour; stem incurved, sub-hollow, clothed with innate scales; taste mild, insipid; whole plant sulphury-yellow. Allied to *A. flavidus* and *A. Junonius*.—On willows, North Wootton, Norfolk; C. B. Plowright.

10. *AGARICUS* (*FLAMMULA*) *JUNCINUS*, *nov. sp.*—Pileus fleshy, inch and half across, hemispherical, sulphury-yellow, with a rich brown disc; veil none; gills broad, very thin, red-brown; stem elongated, thin, four inches long, attenuated downwards, clothed with a few fibres; taste nauseous and disagreeable, somewhat bitter. Allied to *A. mixtus*.—On dead bullrushes in an old clay-pit, North Wootton, Norfolk; C. B. Plowright.

11. *Cortinarius* (*Inoloma*) *tragranus*, Fr. Epic., p. 281.—Forres; Rev. Jas. Keith.—Taste strong, not unpleasant; odour very potent, like that of the larva of the goat-moth.

12. *Cortinarius* (*Dermocybe*) *orellanus*, Fr. Epic., p. 288.—Epping Forest and elsewhere; W. G. S. Shown at the South Kensington Fungus Show, October, 1873.

13. *Hygrophorus pratensis*, Fr., var. *Meisneriensis*, Fr. Mon. Hym. Sueciæ, vol. ii., p. 132.—Largo, Fifeshire.

14. *LACTARIUS EXSUCCUS*, *nov. sp.*—Pileus clothed with adpressed down, fleshy, depressed with an involute margin; gills decurrent, white, shaded with verdigris, connected by veins and forked; stem white, very short, clothed with adpressed down; whole plant rigid and brittle, milkless.

This plant can be no longer considered a mere variety of *L. vellereus*, as first suggested by Fries, Syst. Myc., vol. i., p. 77. Berkeley in the Eng. Fl., p. 31, seems disposed to regard it as a species. The fruit of the two plants, as well as the general habit and specific characters, is moreover very different.

15. *RUSSULA SUBFÆTENS*, nov. sp.—Pileus bullate, sub-viscid, disc fleshy, margin sub-membranaceous; gills thick, distant, and branched; stem not stout as in *R. fætens*, than which ours is altogether smaller; odour somewhat disagreeable; taste slightly acrid. Various localities.

This is the plant referred to by Fries in his Syst. Myc., vol. i., p. 58, as a var. of *Russula fragilis*; but *R. fragilis* has crowded, thin, and generally entire gills, whilst those of our plant are thick, distant, and branched. Our plant is much nearer *R. fætens*, but it differs in its margin, &c., and is a good species.

16. *NYCTALIS CALIGINOSA*, nov. sp.—Pileus very fleshy, when dry white, flocculoso-pruinose, when wet marked with colours as in *Agaricus butyraceus*; margin involute, slightly exceeding the gills; gills thick, branched, decurrent; stem solid, flocculoso-pruinose, base naked; odour and taste rank and disagreeable like *Polyporus squamosus*. Closely allied to *N. parasitica*, but at once distinguished by its truly decurrent gills and other characters.—Amongst earth and dead leaves in a dark dense part of Bishop's Wood, Highgate.

17. *CYPHELLA CATILLA*, nov. sp.—Submembranaceous, expanded, margin crisped and undulated; hymenium veined, three-quarters inch broad, grey, often imbricated. Allied to *C. galeata*.—On moss and dead leaves, King's Lynn; C. B. Plowright.

18. *Boletus sulfureus*, Fr. Epic., p. 413.—Amongst sawdust, in dense clusters, Aviemore, N.B.; Rev. James Keith.—Fries appears only to have once met with this rare species (Mon. Hymen. Sueciæ, p. 249). Our plant closely resembles *B. pachypus*, var. *amarus*, in general aspect, but it is in reality very different. Taste mild and pleasant, colour golden sulphur, spores oval.

19. *Boletus radicans*, Fr. Epic., p. 415.—Staplehurst, Epping Forest, and various other places.

20. *Boletus pachypus*, var. *amarus*, Fr. Epic., p. 417.—Various places, common; known by its bitter taste and other characters. This is the plant published as *B. cyanescens*, Bull., by Cooke, Journal of Bot., vol. iii., tab. 30, and is the same with Mrs. Hussey's *B. elephantinus*. *Boletus cyanescens*, Bull. (see Myc. Ills., t. 47), is quite a different plant.

SHORT NOTES AND QUERIES.

CAREX PUNCTATA, Gaud., IN PEMBROKESHIRE.—During a short stay at Tenby in August of the present year, I noticed a *Carex* growing on the damp narrow ledges of some perpendicular rocks near a waterfall, on the north side of a small bay, named Waterwinch, situate

about a mile north of the town. It had the look of *Carex distans*, but the fruit-spikes were much more lax than in that plant; and notwithstanding that I had Babington's "Manual" and Hooker's "Student's Flora" with me, I failed to identify it as Gaudin's *Carex punctata* until my return to Manchester, when I found it to answer well to the description of that species given in the last edition of "English Botany." Drs. Syme and Trimen have been kind enough to examine specimens, and both these botanists pronounce it to be the true plant. I may add that I did not notice it in any other locality in Pembrokeshire, although I searched for it carefully, looking upon it at the time as a form of *Carex distans*. Unfortunately the Tenby plant was casting its fruit when I met with it, but I brought away such plants as seemed fit for drying, and these will be sent to the Exchange Club for distribution to British botanists as far as the specimens will go. Now that attention has been drawn to this species it may lead to the discovery of more British stations,* the more so as there are several Irish ones given for it in the "Cybele Hibernica." The Tenby plant agrees pretty well with an Irish specimen of *C. punctata* received last year from the Exchange Club, and collected by Mr. A. G. More at Ardgroom, Cork; and it comes very close to Italian plants I have from Prof. van Heurck, collected near Pisa, and to Tyrolese specimens from Salzburg. The length of the female spike is rather shorter in the British species, although answering exactly in this respect to the figure of the French plant drawn on the plate in "English Botany"; but the most striking character of the species—its inflated spreading fruit—is very apparent in both the Tenby and Continental specimens, much more so than in the Irish specimen referred to above. Two papers on the botany of South Pembrokeshire have already appeared in the "Journal of Botany"; one by Prof. Babington (Journ., vol. i, p. 258), and the other by Dr. Trimen (Journ., vol. v., p. 301). The only additions of apparently native plants which I can make to these lists are *Raphanus maritimus*, Sm., on Windmill Hill, Tenby (a species included for the county in Mr. Watson's recently distributed "Topographical Botany"); *Cerastium quaternellum*, Fenzl., pastures at Giltar Point; *Lathyrus sylvestris*, L., on cliffs near Saundersfoot, but within the county of Pembroke; *Carex remota*, L., Knightston, near Tenby; *Alopecurus bulbosus*, L., amongst brambles on Penally Burrows; and *Ophioglossum vulgatum*, L., growing with *Trifolium fragiferum*, L., in marshy ground near the Black Rock, Holloways Burrows. *Carex Oederi*, Ehrh., is given by Prof. Babington as growing in Penally Marsh, but I noticed in this locality only *Carex eu-flava*, β . *lepidocarpa*, E.B.—CHAS. BAILEY.

EUPHORBIA HYBERNA, EQUISETUM TRACHYODON, &c., IN CO. GALWAY.—During a visit which I recently paid to Galway, I observed *Euphorbia hyberna* growing abundantly at Chevy Chace, a shooting-lodge belonging to Mr. Dudley Perssé, situated about seven miles south-east from Gort. There is here a considerable extent of beautifully-wooded hills, and a river winding amongst them, along the banks of which the Spurge grows as freely as I have seen it anywhere in Kerry. It also grows

* For other localities see p. 48 of this volume.—[Ed. Journ. Bot.]

at Derryea, the property of Mr. Baggot, about a mile off, in the same county. This is the "makinboy" of Threlkeld, who narrates "that a country empirick gave a dose of it boiled in milk to a strong clever youth, about eight miles from Clonmell, which excited a violent hyper-catharsis with convulsions, upon which death followed that night before ten o'clock." In Galway it is known as "makkin-bwee": "makkin" originally meant root, but is colloquially applied to the parsnip; "bwee" means yellow—"makkin-bwee" in English is therefore "yellow parsnip." The Galway people consider it a "grand physic," and give it to horses and cattle, but think it too strong for human patients; nevertheless it is sometimes given, generally to the unknowing in the way of a practical joke. I was told of one individual in Gort who was dosed with it a couple of years ago, and a spectator assured me that he "ran up and down the street like a madman, and swelled so big that his friends had to bind him round with hay-ropes lest he should burst." The country people have a quaint notion of the way in which this medicine is to be extracted. They take about an inch of the root (in which its strongest properties lie), and scrape it into some boiling liquid, generally tea, which draws out its essence; but they firmly believe that "if the root be scraped up it will work upwards, but if you scrape it down it will work downwards, and if it is scraped both up and down it will work every way and will burst you!"; this latter was probably the case of the victim in Gort. In the Aran Islands, in Galway Bay, where the people use herbs to a great extent as physic, I met with nearly the same theory attached to *Polypodium vulgare*. An old woman informed me that this was an excellent physic. "It was to be pulled," she said, "in the full moon, and the roots of it buried in porridge and left there for the night; but," she said, "if you do place the root this way (as it grows) it will work you downwards, and if you place it upside down it will work you upwards, but if you put it both ways it will work you up and down, and it is the best physic that grows." The poisonous properties of *E. hyberna* are turned to account for poaching purposes in Kerry; the country folks throw a quantity of the bruised stems and roots into the streams, in order to stupefy the fish and render them an easy prey. By the side of the stream at Chevy Chace in two places grows *Equisetum trachyodon* (Mackaii, Newman), and in the woods *Carex pendula*, not before observed in the West of Ireland; *C. vulpina* and *C. laevigata*, not hitherto found in Galway. At Roxborough I gathered *Scirpus setaceus*, *Sisymbrium officinale*, *Carex remota*, and *Veronica peregrina*, the latter plentiful in the garden, and all of them plants not before reported from the County Galway. I should have mentioned before that the geological formation at Chevy Chace is the old red sandstone; this and silurian limestone border one another, sometimes with an intervening band of the upper devonian yellow sandstone. The old red seems to be the favourite of the *Euphorbia hyberna*, though in Donegal (where it has been lately rediscovered in small quantities) it grows on granite.—H. C. HART.

CALLA PALUSTRIS PLANTED IN SURREY.—This plant has recently been collected, seemingly wild, in North Surrey. We are able to state that the species was planted there in the year 1861 by a gentle-

man who does not wish the exact locality to be made public. It is right, however, that the fact should be put on record.

RUMEX SYLVESTRIS, &c.—This occurs on the Middlesex shore, between Fulham and Hammersmith, also all the way at intervals between Kew and Mortlake, and on from Mortlake to Hammersmith, so that we have now a continuous distribution along the Thames from Richmond to Putney. *Scirpus carinatus* was also observed in the first locality in considerable plenty. One tuft of *Scirpus maritimus* was seen near the end of the Bishop of London's garden. The occurrence of the two latter species in this county seems to require recent and definite record. This reach of the river is only accessible on this side by hiring a boat.—J. L. WARREN.

TRACHYMENE AUSTRO-CALEDONICA, Benth. Fl. Austral iii., 347, in note, *Didiscus austro-caledonicus*, Brongn. & Gris. in Ann. Sc. Nat., 5 ser., t. iii., 325, has been lately found also in Tanna, one of the New Hebrides, by a young friend of mine—Mr. Campbell, of Geelong—who had occasion this year to visit that group and the Solomon Islands. Mr. Campbell brought several other plants of interest, on which I will furnish notes.—FERD. VON MUELLER.

RUSSULA EMETICA.—In this plant the top is of the most intense and vivid carmine. It may be known from all other species by its flesh being always red under the skin, which readily peels off. By a most unfortunate mistranslation by Berkeley, in his "Outlines," of the original Latin description of this plant, the flesh is by him said to be *white* under the skin, which is contrary to the fact, and in the more recent "Handbook" by Cooke this error is copied. (See Fries' "Epicrisis," pp. 557, 360.).—W. G. SMITH.

THE HOLLYHOCK DISEASE.—This is noticed in the September number of "Grevillea," and has caused considerable damage to the plants on which it has appeared. It is said to be produced by a Fungus, the *Puccinia Malvacearum*, Mont., which has not previously been observed in this country. It was originally described by Montagne as growing on the under surface of the leaves of *Althæa officinalis*, and this year has been found on *Malva sylvestris* at Salisbury, Chichester, and Exeter. My attention was called to it by Dr. E. Capron, who showed me living specimens of the Fungus on Mallow at Shere, in Surrey. Since my return to Eastbourne I have found it abundantly on the same species at Eastbourne and Pevensey. It is a curious fact that an undescribed Fungus should suddenly appear in so many localities at so great a distance apart. Probably a notice in the "Journal" may lead to its being recorded from many more. It appears as small yellow protuberances covering the under surface of the leaves of the Mallow, and these are so abundant and conspicuous that no one who examines an infected plant can escape observing them.—F. C. S. ROPER.

NORTHERN LIMIT OF PHANEROGAMIC VEGETATION. — Captain Markham has most kindly presented to the herbarium of the Royal

Gardens, Kew, a small but very interesting collection of plants brought back by him from his recent Arctic voyage. Amongst them are four specimens which he obtained from Dr. Bessels, who collected them in 82° N., the most northern position from which any phanerogamic vegetation has hitherto been procured. The locality appears to have been on the east side of Smith's Sound. The species are *Draba alpina*, L.; *Cerastium alpinum*, L.; *Taraxacum Dens-Leonis*, Desf., var.; *Poa flexuosa*, Vahl.—J. D. HOOKER, in "Nature."

SCILLA AUTUMNALIS IN ESSEX?—This plant is not included in Gibson's "Flora," but there are specimens in the British Museum from the Banksian Herbarium labelled "Muckford, Essex. Mr. Lightfoot." I do not find this place on the map. Perhaps Mucking, near Tilbury, is intended.—JAMES BRITTEN.

Proceedings of Societies.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.—BRADFORD, 1873.

SECTION D, BIOLOGY. Sept. 18th. *Department of Zoology and Botany.* Prof. Allman in the chair.—"Report of Committee on Influence of Denudation of Forests on Rainfall of Northern Britain." By Prof. Balfour.—Two localities had been fixed upon, viz., Carnwath, Lanarkshire, and Abernethy, Speyside, Morayshire, which seemed likely to be suitable for carrying on the inquiries, as wood was likely to be soon cut down and assistance was expected from the proprietors. It was proposed for one year at least to compare observations in the wooded and naked knolls. At Speyside the forests were composed of pure Scotch Fir.—Dr. Hooker, Mr. Symons, and Mr. Grantham expressed the opinion that observations on the scale proposed were perfectly inadequate.——"On the Flora of the Environs of Bradford." By John Willis, Ph.D. (We shall print this *in extenso*.)

Sept. 19th. *Department of Zoology and Botany.* Prof. Allman in the chair.—"On Crystals in the Seed-coats and Pericarps of Plants." By Prof. Gulliver.*—"On the Mosses of the West Riding." By C. P. Hobkirk (see p. 327).—"On Parasitic Algæ." By W. Archer.*—That green Algæ, contrary to what had been generally supposed, could, though exceptionally, lead a parasitic life, had been recently pointed out by several observers.; Professor Cohn, in describing an interesting new chlorophyllaceous parasitic Alga, remarked that amongst the physiological and vegetative distinctions between the class of Fungi and that of Algæ, the most important was the absence in the former of chlorophyll, and that on account of this want it was assumed that Fungi depended for their nutrition upon organic compounds, and hence must live a parasitic life, since they had not the power like the green

* Published in the "Quarterly Journ. Microsc. Science," Oct., 1873.

plants to assimilate inorganic compounds in sunlight. Later researches, however, went to show that they drew their nitrogen in the same manner as green plants, but that they could not decompose carbonic acid like them, and therefore depended for their carbon upon the assimilation of carbonic compounds already formed in organisms. To the green plants, and especially to the Algæ, the faculty of assimilating such organic compounds was as a rule denied. But certain true phanerogamic parasites produced chlorophyll, and the assumption might be correct that the presence of chlorophyll was not incompatible with the assimilation of organic compounds. A *resumé* was then given of the instances at present known in which green Algæ led a parasitic existence. —“On a Peach-coloured Bacterium.” By E. Ray Lankester.*—In the histological laboratory of Exeter College, Oxford, the author had made observations during the past summer on two jars of river water, which had been standing on a window-sill, but protected from direct sunlight. They contained putrescent remains of some caddis-worms, besides minute Algæ and a purple-red growth. This growth consisted of a film which spread itself over the decaying matters at the bottom of the water, forming in patches an irregular coating on the side of the glass most exposed to the light. After the interval of the vacation it was found that the same growth developed itself in great abundance in a large vessel in which had been left two cray-fish (*Astacus*). The animals had died and were far advanced in putrefaction, and the whole of the sides of the vessels and the remains of the *Astaci* were coloured with a film of a fine purple-red tint. The author found that the organism to the multiplication of which the colour was due was the same in the two cases. The remainder of the paper was occupied by a description of the distinct forms which this organism assumed, and which the identity of colour enabled the author to correlate as stages in the life of one and the same species.

Evening Lecture. Prof. A. W. Williamson, President, in the chair. —Prof. W. C. Williamson commenced his lecture by calling attention to one on the subject of coal delivered a few years ago at Bradford by Prof. Huxley, and to the progress which had been made in our knowledge of coal and coal-plants since that date. With that lecture within their reach it was not necessary for him to enter in detail upon any such questions as the vegetable origin of coal, and the drift theory of its accumulation. Most men are now agreed that it was once a vegetable soil which accumulated under the shade of primeval forests growing on areas of depression. In time the land sank beneath the sea, and the vegetable elements were buried under layers of sand and mud, accumulations of which again restored the area to the sea level, when spores of plants once more germinated in a blue mud, and the succession of phenomena which had previously occurred was again renewed. The frequent repetition of these changes finally resulted in the accumulation of the thousands of feet composing the vertical series of rocks which are termed the Carboniferous strata. Huxley directed attention to some minute coin-like bodies which are very abundant in some coals, and which had been previously noticed by Witham, Morris, Dawson, and Balfour. The larger of these bodies

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Huxley regarded as *sporangia* or spore-cases, and the smaller ones as *spores*, whilst he considered that their disintegration had led in most cases to the formation of the bulk of what we call coal. Prof. Williamson showed in detail that these were not *spore-cases*, but two kinds of *spores*—microspores and macrospores—such as severally occur in the upper and lower portions of the fruits of many living Club-mosses. Their size and their structure demonstrated the truth of this conclusion, which was further sustained by the fact that sporangia were not deciduous, but spores were; and these objects having fallen in such vast myriads from gigantic Club-mosses, can only have been deciduous organs. The lecturer then gave reasons for concluding that these spores had played a much more limited part in the origin of coal than Huxley had assigned to them. He showed specimens of coal distinctly composed of masses of small fragments of mineralised vegetable tissue, but which, when their sections were examined under the microscope, exhibited no trace whatever of organic structure, but were wholly indistinguishable from the ordinary black matter of coal. Specimens were also shown which were masses of spores in shale and ironstone, as well as a large series of sections of the Lancashire coals—some of the best of which had few spores in them, whilst some of the worst abounded with these objects. Thus we have masses of coal with few spores, and of spores without coal. Huxley concluded that coal was composed of mineral charcoal and coal proper—the latter term being equivalent to spores altered or unaltered. The lecturer, on the other hand, recognised three such elements:—Mineral charcoal—*i.e.*, fragments of fossil wood retaining its structure; coal proper—*i.e.*, mineral charcoal disorganised; and spores in various states. Turning to the plants, he called attention to the progress which the study of their organisation had made within the last few years. Beginning with Witham of Lartington, and Brongniart, the work had been carried forward by Corda, Binney, Carruthers, Renault, and many others; working especially upon materials drawn from Autun, Arran, Burntisland, and Oldham. We can now distinguish three groups of fossil plants—1, those of which we have the form, but not the organisation; 2, those of which we have both form and organisation; 3, those of which we know the structure, but are ignorant of the outward form. What has yet to be done is the correlation of the first and last of these three groups. That most of the plants of the coal were Cryptogamic was long ago demonstrated by Brongniart. This is more true even than the demonstrator supposed. These plants are chiefly Calamites, corresponding with living Horse-tails; Lepidodendrons and their numerous allies, now represented by the Club-mosses; Ferns in great numbers; and plants supposed to represent Gymnospermous Exogens. The Calamite was a lofty jointed plant, with a hollow pith, surrounded by a woody zone arranged as a circle of longitudinal woody wedges, the whole being encased in a thick bark. When sand or mud entered the pith cavities it was pressed against the inner edges of the woody wedges, which indented the cast with longitudinal grooves, whilst a thick ring of pith remaining at each node occasioned transverse constrictions at each joint. The casts thus moulded, and covered with a thin film of coal, the only remnant of the original wood and bark, constitute the objects

generally known as Calamites. The Professor exhibited sections, tracing up the plant from minute twigs to large stems, the least of which latter had been 27 inches in circumference. Hence these plants, in their maturity, must have been arborescent. He pointed out that most of the objects which had hitherto been associated with these stems as leaves and fruit belonged to an altogether different group of plants. Their true verticillate leaves and fruit have nevertheless been found. The most conspicuous objects in the Carboniferous forests were certainly the Club-mosses, plants which, whether creeping over our grassy uplands or forming the undergrowth of tropical forests, are now of dwarf dimensions, and possess a corresponding simplicity of organisation. On the other hand, the *Lepidodendra* and *Sigillariæ* of the Coal Measures had stems rising like

the mast
Of some great ammiral,

and of proportionate bulk. This stem supported a cluster of branches densely clothed with leaves, and sustaining innumerable cones; whilst the roots, in the form known as *Stigmariæ*, spread as widely underground as those of a British Oak—the proverbial type of all stability. These gigantic dimensions required a different organisation from that which sufficed for the dwarfed living representatives of these forest trees, and such an organisation was provided for them. The lecturer then traced the processes of growth by which young twigs, with a structure like that of a living Lycopod, were converted, by the addition of successive layers of woody tissue to the exterior of what previously existed, into stems 12 feet in circumference. A double woody cylinder was thus formed. There was an inner one surrounding the pith, and which was a development and expansion of the central vascular bundle of the young twig, and an outer one formed of exogenous layers. Of these two cylinders the latter alone entered the roots, and the former the leaf-clad twigs; hence the sap absorbed by the roots from the soil had to be transferred from the one to the other of the cylinders in order to reach the leaves. It was this class of plants whose cones furnished the macrospores and microspores the nature of which was discussed in the earlier part of the lecture. Closely allied to the Lycopods are the elegant little plants known as *Asterophyllites* and *Sphenophyllum*. These were long believed to be the branches, leaves, and fruits of Calamites; but they constitute a group of which the organisation of both stems and fruits are altogether distinct from that of Calamites. The Professor next reviewed various forms of the stems and leaf-stalks of Ferns, some of which he had succeeded in connecting with the leaves to which they belonged; after which he described the fossil remains of plants of the Pine tribe, of a remarkable form, of which both the stems and fruits are not uncommon in the Coal Measures. He gave his reasons for believing that these trees grew apart from the other more succulent Coal Measure plants, on higher and drier ground, their fragments having been floated down to the Carboniferous deposits as drift-wood. The plants thus far noticed by the lecturer were entirely confined to the two groups of Cryptogams and Gymnospermous Exogens. The question arises, Were there in that age no representatives of the Dicotyledonous and Monocotyledonous plants—that is, plants of the ordinary

flowering types? Several such have been included in published lists, but on investigation they all melt away. One which has been believed to be a Palm the Professor showed to be a Fern. Another, regarded as a near ally of the Broom-rape, was now known to be nothing of the kind. The evidence that any such plant existed during this early age of the world was of the most unsatisfactory kind, and all the known Carboniferous deposits from Greenland to Australia told the same tale of a cosmopolitan vegetation limited to the Cryptogamic and Coniferous types. The physiological teachings of these ancient fossils were next examined. The existence of an exogenous process of growth in the stems of Calamites, Lycopods, Asterophyllites, and others, was dwelt upon as a phenomenon which has no counterpart in the living plants of the same types; and it was further shown that this mode of growth was also absent, or so nearly so that the faint exception only proved the rule, from all the fossil and recent Ferns, whether herbaceous or arborescent; and the Professor concluded his lecture by pointing out that the hue of the Carboniferous vegetation must have been one unbroken green, like that which Mr. Wallace has shown to be the characteristic of the tropical forests of the present day.

Sept. 20th. *Department of Anatomy and Physiology.* Prof. Rutherford in the chair.—“On the Movements of the Glands of *Drosera*.” By A. W. Bennett.—The observations were all made on *Drosera rotundifolia*. The glands of *Drosera* are in no sense hairs—that is, cellular expansions of the epidermis of the leaf. They have been shown by Groenland and Trécul to be an integral part of the leaf itself, penetrated by a fibro-vascular bundle with spiral threads (in other words by a vein or nerve of the leaf) from one end to the other, and even furnished with stomata on their surface. They terminate in a pellucid knob, within which is formed their peculiar viscid secretion. Under a low magnifying power this secretion may be seen collected about the knobs and stretching in glutinous strings from one to another. The secretion has probably an attraction for flies and other small insects, as, if the plant is examined in its native bogs, scarcely a leaf will be found in which an insect is not imprisoned, and one leaf will very often show as many as three or four. The experiment was made of placing a very small insect, a species of Thrips, on a leaf at that time quite unencumbered, beneath a low power of the microscope; immediately on coming into contact with the viscid secretion it made vigorous efforts to escape, but these efforts only seemed to entangle it all the more deeply. The contact of the insect appeared to excite a stronger flow of the secretion, which soon enveloped the body of the animal in a dense and almost transparent slime, firmly glueing down the wings and rendering escape hopeless. It still, however, continued its struggles, a motion of the legs being clearly perceptible after the lapse of three hours. During all this time the insect was sinking lower and lower down among the glands towards the surface of the leaf, but only a slight change had taken place in the position of the glands themselves, which had slightly converged so as to imprison it more completely. But after the struggles of the prisoner had practically ceased, a remarkable change took place in the leaf. Almost the whole of the glands on its surface and its margin, even

those removed from the body of the insect by a distance of at least double its own length, began to bend over and point the knobs at their extremities towards it, though it was not observed that this was accompanied by any increased flow of the secretion from them. The experiment was made in the evening, and by the next morning almost every gland of the leaf was pointing towards the object in the centre, forming a dense mass over it. The sides of the leaf had also slightly curved forwards, so as to render the leaf itself more concave. The nearly-allied *Dionæa muscipula*, of the United States, which imprisons flies by a much more sudden motion of the sides of the leaf, collapsing when irritated on the upper surface, is said to digest and absolutely consume the insects thus entrapped. What becomes eventually of the prisoners of the Sundew my experiments have not yet been carried sufficiently far to ascertain. It will be seen that the most singular feature in the phenomena described is that the motion of the greater number of the glands did not begin till after the insect had become comparatively motionless; and therefore it is very difficult to attribute it to the excitement caused by the struggles in any "contractile tissue" at the base of the glands—an explanation which has been offered for the sudden and rapid motions of the stamens of *Berberis* or the leaves of *Mimosa*. It is also quite certain that the impinging of rain-drops on the surface of the leaf causes no similar motion—a peculiarity similar to that which Darwin has observed in the case of the motions of tendrils and climbing stems. In order to determine what share in these motions of the glands was due to the organic nature of the substance imprisoned and to its power of motion, the following experiments were also made:—A small piece of raw meat was placed on another leaf similar to the first. No immediate change was observable, and no increased flow of the secretion, but after the lapse of a few hours a perceptible inclination towards the object of the more distant glands took place. The next morning the piece of meat was found, like the fly, sunk down to the surface of the leaf, with almost the whole of the glands converging towards it and above it in just the same manner. The changes here were, therefore, perfectly of the same kind as in the case of the fly, though apparently somewhat slower. After the lapse of twenty-four hours the piece of meat appeared decidedly lighter in colour; but an accident prevented the process of digestion being further traced. On other leaves were placed a minute piece of wood and a small piece of worsted; and in neither of these cases was the least change perceptible after the lapse of a considerable time in the position of the object nor in that of any of the glands, either those in contact with it or the more remote ones. It would appear, therefore, as if the organised structure of the fly and of the piece of raw meat had some power of exciting this motion which is not possessed by matter of a different description.—

"On the Electrical Phenomena accompanying the Contraction of the Cup of *Dionæa*." By Dr. Burdon Sanderson, F.R.S.—This plant has a peculiar formation of leaf, the two halves of which are jointed on one another at the midrib, and are fringed externally with long hairs. On the application of an irritant the two parts come together, retaining enclosed between them any small body which, like an insect, may chance to be resting on the surface. Dr. San-

derson showed that when this action took place it was accompanied by the exhibition of electric phenomena analogous in their nature to those which occur when nervous or muscular actions are induced in animals, and he thus pointed out a striking confirmation of the universality of the laws which obtain in all organised structures. Mr. Bennett's surmise that the leaves of *Drosera* possess the power of digesting, just as the stomach digests food, had been fully realised by observations made by Mr. Darwin, but not yet published.—The Chairman pointed out that a very important result of Prof. Sanderson's experiments, which had not been indicated by him, was the bearing which they had on Hermann's recent teaching regarding the origin of electricity in living tissues. Prof. Hermann maintains that the electrical currents in muscle and nerves do not normally exist, but that they are produced in these tissues by the injuries inflicted upon them during the preparation of the tissues for the purpose of experiment. In the case of muscle and nerve the tissues are cut and variously manipulated, so that they are no longer in their normal condition. Dr. Rutherford had never adopted this theory, notwithstanding the importance which was attached to it in Germany, and he thought that, inasmuch as Dr. Sanderson had obtained the electrical currents from the leaf of the Fly-trap without cutting or otherwise injuring it in any way, the fact ought to convince Prof. Hermann that such currents are really produced in uninjured living tissues when these are allowed to remain at rest and undisturbed.—

"On the Motion accompanying Assimilation and Growth in the Fucaceæ." By Prof. Martin Duncan.*—It was suggested that these plants absorb organic matter in a state of solution, there being abundance of such soluble matter not yet resolved into its ultimate elements, floating in the sea.—Prof. Thiselton Dyer thought the suggestion a hazardous one, that the plants obtained any portion of nitrogen in an uncombined form from the air dissolved in the sea.—

"On Tree-Fern Stems from the Coal Measures." By Prof. W. C. Williamson.—He described a series of specimens which he believed to belong to the group of Ferns, beginning with the examples to which he had given the generic name *Edraxylon*. He stated that he had obtained specimens in which the leaves were attached, and by means of these he was in a position to demonstrate that the plant was the petiole of a species of *Pecopteris*, and further that it was one of a small group of the genus in which the surface of the stems and leaf-stalks were covered with small, warty excrescences. A series of other stems was then examined which appeared also to be Ferns, and the author especially dwelt on the genus to which Cotta gave the name of *Medullosa*, and identified it with the other genus to which the name of *Palmacites* had been given. The peculiarities in its structure led him to reject the generally-accepted belief that *Palmacites* was a Palm stem, as its name implied, he being more disposed to consider it a Tree Fern. Examining into the meaning of these structural differences, he showed that the presence of exogenous growths on the one hand, and the absence of exogenous growths on the other, meant something more than mere differences of size, because he found small plants possessing

* This paper will be published in the "Quarterly Journ. Microsc. Science."

that mode of growth, and in many large ones (especially as seen in the fossil Fern stems and the Tree Fern of the present day) no such exogenous growth existed. He concluded by saying that since in these exogenous stems there was the characteristic feature of the pith and wood arranged in radiating laminae separated by medullary rays, and surrounded by an external investment, he felt justified in applying to those parts the names of "pith," "woody wedges," "medullary rays," and "bark," assuming that some terms were necessary to designate these objects, and that it was exceedingly undesirable to invent new ones where there was so much reason for believing that the old ones would do.

Department of Zoology and Botany. Prof. Allman in the chair. —"Remarks on Plants Collected by the Voyager Dampier." By Prof. Lawson.—Dampier, to whose botanical collections this paper referred, lived through the middle and at the end of the seventeenth century. He went to sea at an early period of his life, first as one of the buccaneers, and afterwards in the capacity of captain of one of the King's ships, when he was sent to explore the farther and little-known regions of the globe. He visited New Holland, the Cape of Good Hope, and other parts of Africa, besides America. His collection of plants, though small, contained many new and strange species, and a list of forty of the more curious was published in an appendix to Ray's "*Historia Plantarum*" in the year 1704. This collection of plants somehow or other came to Oxford, and is now preserved there. Some time ago the author was asked by Dr. Müller, of Melbourne, to examine them with a view to their identification, and he had now done so. The collection possessed no particular points of interest, for owing to some reason or other the specimens were in some instances mixed and their localities confounded.——"On a Tree Aloe from S.E. Africa." Extract from a letter from Mr. T. Baines, dated July 15th, 1873.—The tree grew on the slope of a rugged hill overlooking the sources of the Inada or Inanda rivulet, tributary of the Tugela river, and perhaps nineteen or twenty miles north-east of Greytown. On the 5th June, while proceeding to examine a hill near the Tugela, reported to be auriferous, the writer first noticed the arborescent Aloes, and remarked their similarity to the great Tree Aloe of Damara-land; returning on the 21st June, he saw a flower of a bright orange or scarlet colour on one of the trees. One of the sketches forwarded represented a tree with a trunk about 2 ft. thick and 20 ft. high, and the spread of its crown about 15 ft., and being at 5 or 6 ft. from the ground, divided into half-a-dozen branches, and these, again, subdivided into many more. The bark was white and smooth, as in the Tree Aloe of Damara-land, but the leaves were long and slender, with small hooked thorns along the edges, and curved downwards. The flower, he believed, was scarlet and orange. Since his arrival in D'Urban he was told that Aloes similar had been found in the Noodsberg.——"On the Subalpine Vegetation of Kilima 'njarö." By Dr. J. D. Hooker (see vol. x., p 235).—"On a Course of Practical Instruction in Botany." By Prof. Lawson.—It having been found that those who taught science in the large towns were, as a rule, destitute of all practical acquaintance with the subjects they professed to teach, and only retailed information with which they had crammed

themselves from books, the Educational Department determined to institute at South Kensington courses of lectures that should be followed by demonstrations and practical work in laboratories and dissecting-rooms, and that each year there should be selected a certain number of the most promising teachers to be trained more thoroughly. This work, as far as biology was concerned, was entrusted to Prof. Huxley. The first course began in July and August, 1871. Prof. Huxley every day at ten o'clock gave a lecture on some particular object, its structure, its mode of growth and manner of increase, its behaviour under the action of different chemicals, and the bearing which the changes produced had upon the subject of living matter generally. The lecture over, the students repaired to the dissecting-room, where they were occupied in examining the structures in question, and verifying the statements they had heard. Each student was required to take notes, and to make drawings of all points of importance, and on the following morning to give them up to the demonstrators. Care was also taken that the subjects treated of should illustrate the larger division of the whole of the organic world. The student was not, therefore, led into the error of giving undue importance to some one group of beings in organised nature. The next year's teaching included a much larger number of forms selected from the animal kingdom only, but Prof. Huxley recommended a series of lectures on advanced Botany for those who wished to extend their knowledge of the vegetable world, and Prof. Dyer and himself made the necessary arrangements. Difficulties had to be contended with, but the progress which had been made was not so slow as might be supposed. The author hoped that they might lead to similar instruction being given in all the other great schools of our land.—The President and Prof. Balfour perfectly agreed that the new system described in the paper was the best that could be adopted, and be most beneficial to all students.—Prof. Thiselton Dyer said it must be remembered that in the course of instruction which the Government had permitted to be given at South Kensington there were very considerable advantages arising from the sort of men who were students. They were most eager to learn, being professionally themselves teachers. They had broken ground in the study already, and were desirous to take in every description of knowledge that they could be supplied with. There was also the continuous attention of the students the whole day, which was an advantage that could hardly be too much appreciated.—“On some of the Changes going on in the South African Vegetation through the Introduction of the Merino Sheep.” By Dr. John Shaw.—Civilisation and merino sheep had introduced one obnoxious plant, *Xanthium spinosum*, into the sheep-walks of South Africa. Its fruit getting into the wool, and seriously injuring its value, the Government had legislated for its compulsory destruction. In the Orange River Free State, where there was no legislation on the subject until lately, wool had become deteriorated nearly 50 per cent. But sheep in connection with the overstocking of farms in the inland districts of the Cape were doing very serious injury by eating down the better and more agreeable plants, giving range to poisonous and bitter ones, and even changing the climate. After a sketch of the distribution of

plants in South Africa, the paper went on to particularise the character of the prairie-like midlands of the Cape, with their luxuriant grass and vegetation. Since sheep had been introduced the grass had fast disappeared, and the ground, by the hurried march of sheep for food amongst a scattered bush, had become beaten and hardened, and the seasonable rains ran off the surface. The plants of the singular region known as the Karoo, in the south-west of the Cape, were travelling northwards rapidly, and occupying this dry tract of country. The herbage was essentially a Karoo one already.—

“The Vegetation of Bermuda.” By H. N. Moseley (H.M.S. *Challenger*).—The terrestrial vegetation of the island divided itself over five principal stations, each of which had a flora more or less peculiar to itself. These were the coast line with its littoral flora, the peat bogs or marshes, the shallow brackish ponds, the caves, and the remaining general land surface. The coast was either rocky, presenting an irregular surface of weathered calcareous sandstone, or it was sandy, the sand being blown up into heaps. Covering extensive tracts abundantly along the whole coast line occurred two low shrubs. One, a composite (*Borrichia*) with a yellow flower, occurred in two forms. In one the thick succulent leaves were bright green and shining; in the other they were glaucous and downy. The two varieties grew side by side, and contrasted strikingly with each other. With this occurred, amongst other species, *Tournefortia gnaphalodes*, with downy leaves and white flowers; a *Sesuvium*; *Euphorbia glabrata*; *Salicornia ambigua*, which did not flower till July, growing on the very verge of the waves; *Conocarpus erectus*, and *Cakile aequalis*. The chief feature of the vegetation in the marshes was formed by the Ferns, especially two, *Osmunda cinnamomea* and *O. regalis*. The peat water was full of a *Conferva*, and the peat was mainly composed of the *débris* of the rhizomes of the Ferns and roots of the Sedges, especially one very large species, a *Cladium*. The *Sphagnum* was not abundant enough to take any great share in its formation. The peat burnt well. The stems of Junipers were occasionally found in it in good preservation, and of larger size than any now growing in the island. A bed of lignite was found in excavating for the Bermuda Dock, at a depth of 50 feet, evidently the remains of an ancient peat bog overwhelmed by encroachment of sand, and then sunk either by general subsidence of the island, or perhaps the falling in of some underlying cave. More than half the whole number of species collected consisted of Old World weeds which were naturalised in the island.

Botanical News.

ARTICLES IN JOURNALS.—SEPTEMBER.

Grevillea.—M. J. Berkeley, “Notices of North American Fungi” (contd.).—C. B. Plowright, “Fuckel’s Classification of *Sphaeriacei*.”—*Ib.*, “Two New Species of Fungi recently found in Norfolk.”—Abstract of Bornet’s paper “On Gonidia of Lichens.”

American Naturalist.—J. W. Chickering, jun., "Flora of the Dismal Swamp."

Oesterr. Bot. Zeitschr.—J. Pantocsek, "Plant. nov. per Hercegovinam et Montenegro coll." (eleven new species; *Pantocsekia*, Griseb. gen. nov. Convolvulacearum).—R. von Uechtritz, "Botanical Notes."—L. Celakovsky, "On the Notion of a Species, &c." (contd.).—J. Wallner, "Supplement to Mycology of Lower Austria."—P. G. Strobl, "Excursion to Summit of the Lichtmessberg."—J. Krzisch, "Localities near Wiener-Neustadt" (contd.).—H. Kemp, "Supplement to Flora of Neighbourhood of Vorarlberg."

Bot. Zeitung.—E. Stahl, "Development and Anatomy of Lentils" (tab. 5, 6).

Botaniska Notiser (Sept. 15).—O. Nordstedt, "Can the Leaves of *Drosera* eat Flesh?"—S. Berggren, "On a Twisted Pine in South Smoland" (tab. 1).—Ib., "On the Development and Structure of the Pro-embryo in *Diphyscium* and *Ædipodium*" (tab. 2).—O. Nordstedt, "Notes on the Annual Zones of Small Pines."

New Books.—"Traité de Botanique," part 1 (a French translation with notes by Van Tieghem of Sach's "Lehrbuch der Botanik").—F. von Mueller, "Fragmenta Phytographiæ Australiæ," part 61.

The seventeenth half-yearly Report of the Marlborough College Natural History Society contains an elaborate series of tables of the dates of first flowering of 124 species of common plants in the neighbourhood of the school. The observations have extended over nine years. Under each species are given details of the temperature and rainfall for six weeks before the observed date of first flower in each year, and calculations of means and range of variation. The duration of flowering of each plant is also given for five years. These tables will reward a careful examination.

We have received the fifteenth part of Mr. T. B. Flower's "Flora of Wiltshire," containing the orders from *Juncaceæ* to *Cyperaceæ*.

In a recent number of the "Comptes Rendus" M. A. Brongniart describes the Palms of New Caledonia, from the material collected by Balansa, Veillard, and Pancher. Eighteen species are found in the island besides the Cocoa-nut, which is considered to be introduced. All belong to the tribe *Arecineæ*, three being referred to *Kentia* of Blume, three to *Kentiopsis*, Brongn., which differs from *Kentia* in having twenty to fifty stamens united in the centre of the flower; the other twelve are included in a new genus, which is called *Cyphokentia*, characterised by its unsymmetrical fruit, with a gibbosity on one side. It is remarkable that none of the other tribes of Palms distributed through the Pacific should be represented, so far as known, in New Caledonia.

Some very good papers, by W. H. Grattann, which have been in course of publication in the pages of a weekly newspaper called the "Bazaar, Exchange, and Mart," have been reprinted under the title of "British Marine Algæ," in sixpenny parts, well illustrated.

The Algæ collected by Mr. Kurz in Arracan and British Burmah have been determined by Dr. G. Zeller, of Stuttgart, and are published

in the Journal of the Asiatic Society of Bengal, vol. xlii., pt. 2, p. 175. Many new species are described.

The "Scottish Naturalist" tells us that the Rev. J. Fergusson is preparing for publication a Manual of British Bryology.

Mr. Hardwicke announces to be commenced shortly "The British Hepaticæ" in 12 parts, at 2s. 6d. each, the plates by the late J. E. Sowerby, the descriptions by Dr. Carrington, well-known for his investigations of the group; Messrs. Blackwood will publish an "Advanced Text-Book of Botany," by Dr. Robert Brown; and Messrs. Churchill announce a new work on Medicinal Plants, in monthly numbers, by Prof. Bentley and Dr. Trimen, with coloured plates.

The serious illness of Dr. Pritzel has for some time interrupted the issue of the parts of the new edition of the "Thesaurus"; we are, however, very glad to learn that that useful book is to be continued by Prof. C. Jessen, of Eldena.

Dr. Willkomm, Professor in the Dorpat University, has been appointed Professor of Systematic Botany and director of the Botanic Garden in the University of Prag.

In connection with the International Horticultural Exhibition to be held at Florence next May, a congress of botanists is contemplated. The committee of management includes the names of the best known Italian botanists, and has Prof. Parlatore for president, and Prof. Targioni-Tozzetti as secretary. We have received a general programme of arrangements, and a list of the subjects proposed for discussion.

The annual show of Fungi at the Royal Horticultural Society took place on October 1st, and brought together a large gathering of mycologists. The exhibition was a very good one, but suffered from want of proper arrangement of the specimens. Many rarities were shown, including *Strobilomyces strobilaceus* from Hereford, *Paxillus atroamentosus* from Woburn, and *Russula aurata* from Horsham. A *Hydnum* sent from Somerset by Mr. Clark was thought to be *H. squamosum*, new to Britain, as is also *Cortinarius orellanus*, brought from Epping by Mr. W. G. Smith. The first prize was awarded to Mr. J. English, of Epping, who exhibited a fine series from that locality.

The death is announced at Philadelphia on August 14th of Elias Durand, in his eightieth year. He was for many years an apothecary in Philadelphia, but had not lately followed his profession. He was the author of *Plantæ Hermannianæ* and *Plantæ Prattenianæ*, accounts of Californian collections, and of reports on the botanical results of other American expeditions.

Mrs. Margaret Scott Gatty, who died last month at the age of sixty-four, was best known as a writer for children, but in 1863 published a work on British Seaweeds, to which she had given much attention, illustrated with plates reduced from Harvey's "Phycologia Brit.," and which was reprinted last year.

We have also to record the death of R. M. Stark on the 29th of September, æt. fifty-eight. He was the author of a popular History of British Mosses, and of several papers in the Edinburgh Botanical Society's Transactions. He followed the occupation of a nurseryman, and had a fine collection of "alpine" plants.

Original Articles.

ON MELIANTHUS TRIMENIANUS, *H.f.*, AND THE AFFINITIES OF GREYIA SUTHERLANDI.

By J. D. HOOKER, C.B., M.D., F.R.S.

(TAB. 138.)

ON his return to Cape Town from an official visit to Namaqua Land, His Excellency Sir Henry Barkly, Governor of the Cape Colony, was so good as to send me some very interesting remarks on the botany of that little-visited region, including a notice of a *Melianthus* with scarlet flowers, which did not agree with the description of any of the four species described in Harvey's "Flora Capensis." The scarlet colour of the flower immediately recalled to my mind that of the anomalous genus *Greyia*, Hook. & Harv., which I had, in opposition to my late friend Dr. Harvey's views, referred to the near neighbourhood of *Melianthus*. I could not but hope that the colour, so foreign to *Meliantheæ* and so conspicuous in *Greyia*, might be correlated with other characters that would establish the disputed affinity of the latter genus; and I awaited with impatience the arrival of the preserved specimens which Sir Henry had promised me. The next mail brought two, one in flower and the other in young fruit, which dissipated my hopes. Nevertheless, I shall take the opportunity afforded me by Dr. Trimen, of describing this new species, at the same time offering my views on the affinity of *Greyia*, which has lately flowered at the Chelsea Botanic Garden (for the first time in England), and has been figured in the "Botanical Magazine" (t. 6040).

MELIANTHUS (*Diplerisma*) *TRIMENIANUS*, foliolis loriformibus marginibus revolutis integerrimis subtus villosis, stipulis subulatis, racemis erectis, floribus verticillatis, petalorum unguibus ad commissuras villosis ceterum glaberrimis, capsula glabra tetraptera.

Hab.—In Africae australi-occidentalis ditione Namaqua Land,
H. E. Sir H. Barkly.

Fruticulus 2-3-pedalis, ramosus; ramis flexuosis, in exemplaribus nostris crassitie pennæ corvinæ, cortice fusco, ligno sat duro. *Folia* 3-5 pollicaria, breviter petiolata, petiolo basi subdilatato rachique anguste alatis, alis coriaceis marginibus revolutis, articulis interfoliola superne dilatatis cuneato-obcordatis, subtus costaque pubescentibus; foliola 4-8, subhorizontalia, 1-2½ poll. longa, ⅙-⅓ poll. lata, stricta v. falcata, e basi angusta sæpe obliqua linearia vel loriformia, stricta v. falcata, e basi angusta sæpe obliqua linearia vel loriformia, coriacea, obtusa v. costa excurrente apiculata, marginibus recurvis integerrimis; supra glaberrima, luride viridia, costa impressa, nervis nullis; subtus pallida, pube alba pilosa, pilis stellatim fasciculatis elongatis gracilibus strictis inarticulatis cum pube tenui immixtis, costâ prominula. *Stipulae* petioli basi breviter adnatæ, strictæ, sub-

ulatae, $\frac{1}{3}$ - $\frac{1}{4}$ poll. longae. *Racemi* terminales, stricti, erecti, multiflori, 3-5 pollicares, pedunculo valido rachique rubro-viridi puberulis, obtuse angulatis; verticillis 4-6 floris, internodiis $\frac{1}{2}$ -1-pollicaribus; bractea patentes et reflexae, $\frac{1}{3}$ poll. longae, late ovatae, caudato-acuminatae, concavae, virides. *Flores* in verticillis subunilaterales, horizontales, resupinati, terminalibus masculis, pedicellis validis apice dilatatis bracteis aequilongis puberulis. *Calyx* persistens, viridis, glaberrimus, coriaceus, basi obliquus sed vix gibbus; sepala 5, fere ad basin libera; 2 antica aestivatione interiora, horizontalia, late oblonga, acuminata, 3-5-costata; posticum aestivatione exterius, anticis brevius, demum deflexum, late ovatum, valde concavum, obtuse 3-lobum, lobo intermedio acuto v. in caudam coriaceam producto; 2 lateralia aestivatione intima, ceteris multo angustiora, lanceolata, subacuta, falcata, adscendentia. *Petala* 4, decidua, cum sepalis alterna, quinto antico deficiente, unguiculata, declinata; ungues anguste lineari-oblongae, incurvae, crasse carnosae, intus concavae, glaberrimae, purpureae, apices versus ope fasciculo villorum cohaerentes, ceterum glaberrimae, nitidae; laminae $\frac{3}{4}$ poll. longae, lanceolatae, acuminatae, undulatae, pendulae, coccineae, 2 laterales extus plus minusve unilobatae. *Discus* sepalo postico antepositus, elevatus, hippocrepiformis, carnosus, laevis, postice emarginatus. *Stamina* 4, persistentia, sub anthesi elongata, didynama; filamenta filiformi-subulata, apice acuta; 2 longiora antica, sepalis anticis opposita eaque excedentia; filamentis basi distantibus et paulo dilatatis; 2 postica breviora, recta, intra discum inserta, approximata, filamentis ima basi intus dilatatis ibidemque connatis; antherae dorso basi affixae, oblongae, utrinque obtusae, connectivo crasso dorso convexo, loculis linearibus anticis parallelis; pollen minutissimum, oblongum, utrinque obtusum, flavum, $\frac{1}{600}$ poll. longum, $\frac{1}{900}$ poll. diametro. *Ovarium* ratione floris parvum, oblongum, 4-loculare, 4-quetrum; stylus sub anthesi valde elongatus, persistens, validus, stamina superans, adscendens, curvus, 4-sulcatus, pallidus, a basi crassiusculo sensim attenuatus, apice in stigmata 4 minuta fissus; ovula in loculis 4, 2-seriata, subglobosa, amphitropa? funiculo crasso. *Fructus* immaturus ambitu depresso-sphericus, 1-poll. diametro, ad axim fere cruciatim 4-alatus; alae v. carpella semi-orbiculares, valde compressae, marginibus paullo incrassatis, creberrime nervosae, nervis horizontalibus reticulatis; loculi 4, angusti, ad 2-spermi. *Semina* (immatura) forma varia; alia pyriformia, hilo basilari, et plagis 1 v. 2 lateralibus depressis ovoideis notata, alia orbicularia, depressa, peltata, hilo ventrali, facie dorsali striolato, striis utrinque a linea media descendentibus.

In attaching to this plant the specific name of *Trimenianus*, I have the double pleasure of commemorating the services to botany of the editor of this Journal, and those to entomology of his brother, Roland Trimen, Esq., F.L.S., who accompanied Sir H. Barkly in his tour to Namaqua Land, on the occasion of its discovery.

The affinity of *Melanthus* with *Sapindaceae*, first perceived by Adanson (Fam. Plant. ii., 188), and then taken up by Reichenbach (Consp. Regn. Veg. 201), was confirmed by Planchon (Trans. Linn. Soc. xx., 405), who divided the genus into two (*Melanthus* and *Diplerisma*), and elevated it, in conjunction with *Bersama* and *Natalia*,

into the order *Meliantheæ*. This he separated definitely from *Sapindaceæ* by the albuminous seed, and narrow straight embryo: at the same time he indicated with great sagacity the many salient points of affinity in every organ between the two orders.

In the "Genera Plantarum" I regarded *Meliantheæ* as a tribe of *Sapindaceæ*, after a re-examination of the whole of the latter order, in which I found so many deviations from the normal character of the seed and disk attributed to it by Planchon and others, that it appeared to me to be more natural to unite *Melianthus* with it; except indeed it were determined to break up *Sapindaceæ* into five natural orders, all clearly closely allied, of which one only, *Sapindaceæ* proper, would have more than half-a-dozen genera. In this case there would result, 1. *Sapindaceæ* (from which some would separate *Hippocastaneæ*), with nearly 60 genera; 2. *Acerineæ*, with 3 genera; 3. *Dodoneæ*, with 6 genera; 4. *Meliantheæ*, with 2 genera; and, 5. *Staphyleæ*, with 3 genera; to which would have to be added a sixth order, namely *Greyieæ*, with one genus. Now of these, *Sapindaceæ* proper has the stamens inserted within the disk, accompanying an exalbuminous seed; in *Acerineæ* the stamens are variously inserted and the seeds exalbuminous; in *Dodoneæ* the stamens are outside the disk or in sinuosities of its margin, and the seeds are exalbuminous; whilst in *Staphyleæ* the stamens are inserted in the outer base of the disk, and the seeds are albuminous as in *Meliantheæ*. Uniting all, I placed the latter group as a tribe between *Staphyleæ* and *Dodoneæ*, the position I would still assign to it. Of the above characters, that of a straight or curved embryo, though so prevalent in *Sapindaceæ*, is a very variable one in degree. In both *Alvaradoa* and *Aitonia*, very anomalous plants, which technically fall under *Dodoneæ*, the embryo is straight, with flat cotyledons and a short radicle; it is also straight in *Magonia* and other genera of *Sapindaceæ* proper.

In establishing the order, Planchon subdivided *Meliantheæ* into two genera, namely, *Melianthus*, with a saccate base to the calyx, a rudimentary fifth petal, a capsule 4-lobed at the top and dehiscing by an internal suture, and connate intra-petiole stipules; and *Diplerisma*, with a calyx not conspicuously gibbous, no rudiment of a fifth petal, a scarcely 4-lobed capsule, dehiscing along the back of the cells or wings, and lateral free subulate stipules. But of these characters the gibbosity of the calyx varies greatly in *Melianthus*, as well as in *Diplerisma*; the fifth petal is sometimes present in *D. comosus*; the capsule is 4-lobed though not acutely at the top; in *D. comosus* and *Trimenianus*, and it opens ventrally as well as dorsally in *D. minor* and perhaps others; whilst the stipules, though not connate, are adnate to the petiole in *D. Trimenianus*. These considerations, taken in conjunction with the absolute identity in habit and appearance of all the species, compel me to follow Harvey, in uniting them as sections of one genus.

Natalia, Hochst., the third genus included by Planchon under *Meliantheæ*, and which was originally referred by Bentham to *Sapindaceæ*, differs so much that he has regarded it, together with *Bersama*, Fresen., as the type of a separate tribe, *Bersameæ*, distinguished by the flower not being resupinate, by the more regular calyx, five equidistant petals, as many equal stamens, a very large lobed stigma,

solitary erect ovules and arillate seeds; characters almost sufficient to characterise the *Bersameæ* as an order, if *Meliantheæ* deserve that rank.

Again, Planchon suggested that the *Bersameæ* should consist of two genera, *Natalia*, Hochst. (*Rhaganus*, E. Meyer), a native of the Natal Colony, with connate filaments and a unilateral disk, and *Bersama*, Fres., an Abyssinian plant with free filaments and a nearly complete disk. I have, however, in the "Genera Plantarum" united these genera, which are indistinguishable by habit, and between which the principal character, of the union of the stamens, partly fails in the West Tropical African *B. paullinioides*, wherein the two lower stamens only are connate at the base. This view has been adopted by Mr. Baker in Prof. Oliver's "Flora of Tropical Africa" (vol. i., p. 434), who adds a fourth species from the West Coast of Africa.

Of the species of *Melianthus* enumerated by Planchon, *M. Himalayanus*, Wall., distributed by Wallich as a native of Kumaon, is unquestionably nothing but the Cape of Good Hope *M. major*, L., introduced into the Himalaya. Specimens of it also occur amongst Hohenacker's plants (No. 1059), under Wallich's name, from the Nilghiri, where it is also introduced. *M. major*, L., *minor*, L., *comosus*, Vahl., and *Dregeanus*, Sond., are all well described by Harvey, to which must now be added *M. Trimenianus*, remarkable for its small size, quite entire leaflets, and scarlet petals.

Greyia, the only other genus which has been referred to the near neighbourhood of *Meliantheæ*, is a Natal plant, remarkable for the vivid scarlet colour of its petals, which, like those of *Melianthus Trimenianus*, retain their colour in a dried state; it was discovered by Dr. Sutherland, F.L.S., Surveyor-General of that colony, in mountainous situations, at an elevation of 2—6000 feet, in 1858, and published in 1859 by Dr. Harvey simultaneously in the "Proceedings of the Dublin University Zoological and Botanical Association" (i., part 2., 138, t. 13, 14), and in his "Thesaurus Capensis" (t. 1). In both these works it is provisionally referred to *Saxifrageæ*, in which order he definitely places it in his "Flora Capensis" (ii., 308), published in 1862. In the second edition of his "Genera of South African Plants," however (p. 61), a posthumous work edited by myself in 1868, Dr. Harvey appends *Greyia* to *Sapindaceæ*, as a "genus of uncertain affinity," with the following observation:—"By Dr. Hooker this genus is regarded as a genuine *Sapindaceæ*, of the tribe *Meliantheæ*. Though I allow that there are many points of agreement in the general structure of the flower, yet I am of opinion that the 1-celled ovary, *parietal* placentas, *indefinite and very numerous* ovules, *copiously albuminous* seeds, and *minute, straight* embryo are all important characters at variance with *Sapindaceæ*."

Meanwhile I had, in the "Genera Plantarum" (i., 100), referred *Greyia* to the tribe *Meliantheæ* of *Sapindaceæ*, a conclusion to which I adhere, after an examination of fresh specimens (see "Botanical Magazine," t. 6040), and a reconsideration of the whole subject, and for the following reasons. In the first place, Dr. Harvey overlooked the obliquity of the flower, the unequal stamens and declinate ascending style; then the ovary is not 1-celled with parietal placentation, as he supposed it to be, but truly 4-5-celled, with the ovules 2-seriate in the inner angle of the cell, as in *Melianthus*; the inde-

finite numerous ovules are a valueless character in this case, the ovules of *Melanthus* being in some species 2 only in each cell, and in others 4, whilst in *Bersama* they are solitary; and lastly, the copiously albuminous and small straight embryo are, though at variance with *Sapindaceæ* proper, characteristic of *Meliantheæ*, which latter Dr. Harvey (in the second edition of the "Genera of South African Plants," p. 61) considers to be a tribe of *Sapindaceæ*.

On the other hand the points of resemblance between *Greyia* and *Meliantheæ* are:—the habit; the dilated base of the petiole; the inflorescence; the bracts; the subregular perianth like that of *Bersama*; the æstivation, as far as that has been determined in *Greyia* from advanced buds; the disk; the stamens inserted within the complete disk as in *Bersama*; their form and remarkable elongation during anthesis; the pollen (which is even more minute in *Greyia* than in *Melanthus*, and rather more elliptic than oblong); the angular, deeply grooved ovary with dorsally acute lobes; the stout declinate grooved style, which, like the stamens, thickens and elongates remarkably during anthesis; the axile placentation and 2-seriate ovules; the structure of the capsule, which in its subfollicular nature, venation, and dehiscence almost precisely accords with that of *Melanthus major*; and lastly, the seed, albumen, and embryo.

The points of difference are those of degree chiefly or only, and are confined to the simply-lobed leaves, with no further trace of composition, recalling the analogous difference between *Acer* and *Negundo*; the absence of stipules, or their reduction to the margined base of the petiole; the complete disk, crowned by 8-10 spathulate staminodes; the 8 or 10 stamens; more didymous anthers; the minute punctiform stigma, which is perforated and very obscurely lobed at the mouth (as, however, is the case with the young stigma of *Melanthus minor*); and perhaps the form of the ovules, which I am unable to compare with those of *Greyia*, these being imperfect in my specimens.

I have thus, I trust, established the position of *Greyia*, and would only further suggest the following diagnosis of the three genera of *Meliantheæ*, which may be regarded as subtribes, consisting of a single genus each.

1. MELIANTHUS.—Flores valde irregulares, resupinati. Sepala 5. Petala 4, quinto (antico) deficiente, unguiculata, unguibus connatis. Discus hippocrepiformis, posticus. Stamina 4, postico deficiente. Ovarium 4-quetrum, 4-loculare; stigmatibus minuto 4-fido, ovula in loculis 2 v. 4. Semina exarillata.—Folia pinnata, stipulata.—*Africa austro-occidentali*.

2. BERSAMA.—Flores subregulares, non resupinati. Sepala 5. Petala 5, subæqualia, unguiculata. Discus completus v. semicompletus. Stamina 4-5. Ovarium teres, 4-5-loculare, stigmatibus crasso 4-5-lobo; ovula in loculis solitaria, e basi anguli interni adscendentia. Semina arillata.—Folia pinnata, stipulata.—*Natalia, Abyssinia, Africa austro-orientali*.

3. GREYIA.—Flores subregulares, resupinati. Sepala 4-5. Petala 4-5, sessilia. Discus completus, staminodiis 8 v. 10 brevibus coronatus. Stamina 8 v. 10. Ovarium 4-5-quetrum, 4-5-loculare, stigmatibus punctiforme; ovula in loculis numerosa. Semina exarillata.—Folia lobata, exstipulata.—*Natalia*.

DESCRIPTION OF TAB. 138.

1. Flowering branch of *Melianthus Trimenianus*, Hook. f., from a specimen collected in Little Namaqua Land, South Africa, by Sir H. Barkly. 2. Full-grown leaf. 3. Section of flower. 4. Fruit.

ON THE MOSSES OF THE WEST RIDING OF THE COUNTY OF YORK.

By C. P. HOBKIRK.

(Continued from page 331.)

88. *Hedwigia ciliata*, Hed. Barden Tower! Malham Moor!
89. *Grimmia apocarpa*, B. & S. Bolton! Malham!! Ripon.
90. *G. pulvinata*, Sm. Common on limestone and other walls.
91. *G. trichophylla*, Grev. Barden Tower, Bolton, Pateley Bridge.
92. *G. Donniana*, Sm. Esholt Wood.
93. *G. funalis*, Schw. (*spiralis*, Auct.). West of Ingleboro'.
94. *Racomitrium aciculare*, Brid. Ilkley, Bolton, Harrogate, Addingham.
95. *R. protensum*, A. Braun. Bolton Woods, Austwick.
96. *R. sudeticum*, B. & S. Foalsfoot, Ingleboro', Clapdale.
97. *R. fasciculare*, Schr. Frequent in rocky places.
98. *R. heterostichum*, Hed. Austwick, Barden Tower, Settle, Giggleswick.
99. *R. lanuginosum*, Hed. Ingleboro', Barden Tower!
100. *R. canescens*, Brid. Ilkley, Todmorden.
101. *Ptychomitrium polyphyllum*, B. & S. Esholt, Bolton, and Helks' Woods, Brimham rocks.
102. *Orthotrichum cupulatum*, Hoff. Malham! Skipton, Bolton, Clapham.—*β. nudum*. Clapdale, Bolton Abbey.
103. *O. obtusifolium*, Br. Near York.
104. *O. fallax*, Schp. Near Ripon.
105. *O. tenellum*, Bruch. Ilkley, Wharfedale, Malham.
106. *O. stramineum*, Hornsch. Bolton, Ilkley, Clapham, Kirby Malham, Studley.
107. *O. rupestre*, Schl. One tuft, Ingleboro', 1857.
108. *O. speciosum*, Nees. "Said to have been found at Bolton Br., by S. Gibson, probably only a form of *anomalum*"; Settle!!
109. *O. Lyellii*, Hook. Gennett's Cave, Gordale.
110. *O. rivulare*, Turn. Coverdale, trees near Ripon.
111. *O. Sprucei*, Mont. Rare; banks of Wharfe, on trees.
112. *O. diaphanum*. Common.
113. *O. leiocarpum*, B. & S. Frequent.
114. *O. saxatile*, Brid. (*anomalum*). Malham!! Bolton.
115. *O. crispum*, Hed. Bolton, Gordale, Clapdale, Studley.
116. *O. Bruchii*, Brid. Bolton, Ilkley, Helks' Wood, Fountains Abbey.
117. *O. pulchellum*, Sm. Bolton, Ilkley, Helks' Wood, Pateley Bridge.
118. *O. phyllanthum*, B. & S. Between Bolton and Ilkley, Clapham, Malham.

119. *Zygodon Mougeotii*, *B. & S.* Cliviger! and Rattan Clough, Todmorden!! the Strid, Penyghent, Ingleboro', Heptonstall.
120. *Z. viridissimus*, *Brid.* Bolton Woods! Wharfedale!! Skipton.
121. *Z. gracilis*, *Wils.* Malham!!
122. *Tetraphis pellucida*, *Hed.* Common.
123. *Tetradontium Brownianum*, *Schw.* Todmorden! Harden Moss!! Sawley Moor.
124. *Buxbaumia aphylla*, *Hall.* Sawley Moor, near Ripon; requires confirmation.
125. *Diphyscium foliosum*, *W. & M.* Ingleboro', Todmorden.
126. *Atrichum undulatum*. Frequent.
- 126a. *A. crispum*, *James.* Todmorden!! Saddleworth.
127. *Oligotrichum hercynicum*, *DC.* Todmorden; rare.
128. *Pogonatum aloides*, *Brid.* Frequent; Dunford!! Wessenden!
129. *P. urnigerum*, *Brid.* Bingley, Rombalds Moor, Stansfield Moor!
130. *P. alpinum*, *Brid.* Cliviger! Bolton, Malham, Ingleboro', &c.!
131. *Polytrichum gracile*, *Menz.* Stansfield Moor.
132. *P. formosum*, *Hed.* Frequent; Otley Chevin, Ilkley, Bolton, &c.
133. *P. commune*, *L.* Common.—*Var. fastigiatum.* Stansfield Moor.
134. *P. juniperum*, *Hed.* Rombalds Moor! Ingleby Moor!!
135. *P. piliferum*, *Schr.* Ripon, Bolton, Rombalds Moor, Steeton, &c.
136. *Aulacomnion palustre*, *Schw.* Malham Moor! Ilkley, Cottingley.
137. *A. androgynum*, *Schw.* The Strid, Ackworth, Clapdale, &c.
138. *Orthodontium gracile*, *Schw.* The Strid.
139. *Leptobryum pyriforme*, *Wils.* Hebden, Thorparch, Fountains Abbey, Ackworth, Castleford.
140. *Bryum elongatum*, *Dicks.* Halifax, Todmorden, Ingleboro'.
141. *B. crudum*, *Schreb.* Malham, Settle!! the Strid, Helks' Wood.
142. *B. nutans*, *Schreb.* Marsden!! Dunford!! Brimham rocks!! Otley Chevin.
143. *B. annotinum*, *Hed.* Esholt and Idle Woods.
144. *B. carneum*, *L.* Near Bolton Bridge.
145. *B. Wahlenbergii*, *Schw.* Ilkley, Ingleboro', Austwick.
146. *B. pseudo-triquetrum*, *Schw.* Todmorden! Apperley Bridge! Malham, Ingleboro'.
147. *B. alpinum*, *L.* Stansfield, Austwick.
148. *B. pallens*, *Sw.* Esholt, Bolton, Todmorden, Hebden Bridge, Fountains Abbey, Ackworth, Thorparch.
149. *B. uliginosum*, *B. & S.* Gorple Clough, Todmorden, Ackworth.
150. *B. pallescens*, *Schw.* Arncliffe!!
151. *B. cernuum*, *Hed.* Frequent; Yeadon, Apperley, Skipton, Bolton, &c.

152. *B. inclinatum*, *B. & S.* Common ; Bingley !! Todmorden !! &c.
153. *B. intermedium*, *Brid.* Todmorden !! Skipton, Bolton, Yeadon, Ackworth, Fountains Abbey, Malham Moor.
154. *B. bimum*, *Schreb.* Frequent ; Ripon, Ackworth, Rombalds Moor.
155. *B. capillare*, *Hed.* Common.
156. *B. cæspiticiu*m, *L.* Frequent on walls.
157. *B. obconicum*, *Hsch.* Rare ; Guiseley, Ripley.
158. *B. erythrocarpon*, *Brid.* (*atropurpureum*). Malham Cove ! Apperley, Rawden, Ilkley.
159. *B. sanguineu*m, *Brid.* Ackworth.
160. *B. julaceu*m, *Schr.* Dunford !! Ingleboro', Greensclough, Todmorden.
161. *B. argenteu*m, *L.* Frequent ; Studley !!
162. *B. Zierii*, *Dicks.* Malham Moor, Ingleboro', Whernside.
163. *Mnium affine*, *Bland.* Rombalds Moor.
164. *M. cuspidatu*m, *Hed.* Bolton Abbey, Hareley Wood, Ingleboro'.
165. *M. rostratu*m, *Schr.* Ripon.
166. *M. orthorrhyncu*m, *Brid.* Malham Moor, Ingleboro', Arncliffe Clouder.
167. *M. serratu*m, *Brid.* Wharfedale, Airedale, Fountains, Sedburgh, Settle, Ingleboro', Hackfell, Knaresbro'.
168. *M. hornu*m, *L.* Common in woods, &c.
169. *M. undulatu*m, *Hed.* Frequent ; the Strid, in fruit.
170. *M. stellare*, *Hed.* The Strid, on rocks, Malham Cove, Todmorden !!
171. *M. punctatu*m, *Hed.* Common in moist localities.
172. *M. subglobosu*m, *B. & S.* Langfield Moor ! and Stansfield Moor, Todmorden, Ingleboro', Wessenden !!
173. *Cinclidium stygium*, *Wahl.* Bogs, Malham Tarn ! Ingleboro'.
174. *Mielichhoferia nitida*, *Hornsch.*— β . *gracilis*. Rocks, Ingleby, Greenhow !
175. *Paludella squarrosa*, *Brid.* Between Malham and Arncliffe ? Dr. Carrington.
176. *Amblyodon dealbatus*, *P.B.* Gordale, Stansfield Moor, Todmorden !
177. *Funaria Mühlenbergii*, *Schw.* Studley, Gordale, Malham Cove, Inglebro'
178. *F. hygrometrica*, *Schw.* Common.
179. *Entosthodon Templetoni*, *Schw.* Langdale !!
180. *Physcomitrium ericetorum*, *De Not.* Hareleyroyd, Todmorden.
181. *P. pyriforme*, *B. & S.* Yeadon Mills Pond, &c.
182. *Bartramia (Philonotis) fontana*, *Brid.* Frequent ; Todmorden, Dunford !! &c., &c.
183. *B. calcarea*, *B. & S.* Settle, near Arncliffe, Malham Cove, Clapham, Mickley Wood, Ripon.
184. *B. pomiformis*, *Hed.* Cliviger ! the Strid, Otley Chevin.
185. *B. Halleriana*, *Hed.* Near Sedburgh, Swarth Fell, Austwick Scars.

186. *B. Cederi*, *Flærcke*. Arncliffe, Malham Cove, Bolton and Helks' Woods.
187. *B. ithyphylla*, *Brid.* Ingleboro', Malham Moor
188. *B. arcuata*, *B. & S.* Ingleboro', Helks' Wood, near Sedburgh, Thornton Foss.
189. *Discelium nudum*, *Brid.* Bolton, Shibden, Todmorden!!
190. *Splachnum ampullaceum*, *L.* Greenfield, Ripon.
191. *S. sphæricum*, *Hed.* Stansfield Moor! Ingleboro'! Holme Moss!! Gordale.
192. *Tetraplodon mnioides*, *B. & S.* Micklefell! Cantley Crag, Sedburgh.
193. *Schistostega osmundacea*, *W. & M.* Greensclough, Todmorden!! Cliviger! Pateley Bridge.
194. *Fissidens exilis*, *Hed.* Todmorden Valley!! (rare).
195. *F. viridulus*, *L.* Pontefract!! (rare).
196. *F. pusillus*, *Wils.* Ilkley Wells, Todmorden.
197. *F. bryoides*, *Hed.* Common.
198. *F. osmundioides*, *Hed.* Langfield Moor!! Kingsdale, Craven.
199. *F. adiantoides*, *Hed.* Frequent.
200. *F. taxifolius*, *Hed.* Yeadon, Bolton, Hareley Wood, Fixby!! Shipley Glen!!
201. *F. tamarindifolius*, *Don.* Stansfield, near Todmorden; rare.
202. *Anœctangium compactum*, *Schw.* Greensclough, Whernside.
203. *Leucodon sciuroides*, *Schw.* Bolton Woods! &c.
204. *Antitrichia curtipendula*, *Brid.* Bolton Abbey, Barden Tower, Strid, Malham.
205. *Anomodon viticulosus*, *B. & S.* Bolton! Bingley, Gordale, Clapdale, Whitestonecliffe.
206. *Isothecium myurum*, *Dill.* Bolton Abbey! &c.
207. *Climacium dendroides*, *W. & M.* Todmorden! the Strid, Ingleboro'.
208. *Cylindrothecium Montagnei*, *Bry. Eur.* Todmorden! Malham, Gordale.
209. *Leskea polyantha*, *Hed.* Bolton Abbey! Broughton Hall.
210. *L. pulvinata*, *Wahl.* Near Tadcaster, Rawcliffe!
211. *L. polycarpa*, *Ehr.* The Skell, Ripon, Studley, Bolton Bridge, Tadcaster.
212. *L. sericea*, *Dill.* Frequent in limestone districts; Castle Howard!!
213. *L. rufescens*, *Hall.* Gordale, Malham, Kilnsey.
214. *L. subrufa*, *Wils.* Coverdale! Greensclough!! Malham, Gordale, Ingleboro', Heptonstall, &c.
215. *L. moniliformis*, *Walk.* (*Myurella julacea*, *Bry. Eur.*) Ingleboro', Penyghent.
216. *Hypnum (Thuidium) tamariscinum*, *Hed.* Frequent.
217. *H. delicatulum*, *Dill.* Helks' Wood, Bolton Woods.
218. *H. (Camptothecium) lutescens*, *Dill.* Helks' Wood! Skipton, Malham.
219. *H. nitens*, *Dill.* Malham Tarn!
220. *H. (Brachythecium) glareosum*, *Bruch.* Malham Tarn, Helks' Wood, Bolton Woods.

221. *H. albicans*, *Dill.* Todmorden.
 222. *H. velutinum*, *L.* Common.
 223. *H. rutabulum*, *L.* Common.
 224. *H. rivulare*, *Bruch.* Esholt Beck, banks of Wharfe at Bolton, Todmorden.
 225. *H. populeum*, *Hed.* Frequent.
 226. *H. plumosum*, *Sw.* Addingham, Todmorden ! Clapdale.
 227. *H. (Eurhynchium) myosurioides*, *L.* Rawden, Bingley, Bolton.
 228. *H. catenulatum*, *Schw.* Yoredale, west of Ingleboro'.
 229. *H. heteropterum*, *Bruch.* Greensclough !! Esholt, near Settle.
 230. *H. striatum*, *Hed.* Bolton Woods ! Castle Howard !
 231. *H. piliferum*, *Schr.* Castle Howard ! Bolton, Rombalds Moor.
 232. *H. crassinervium*, *Tayl.* Bolton Abbey, Malham.
 233. *H. prælongum*, *Dill.* Castle Howard ! Huddersfield !! &c.; frequent.
 234. *H. pumilum*, *Wils.* Ingleboro', Todmorden.
 235. *H. Swartzii*, *Turn.* Bolton Woods !! Skipton, Clapdale, Yeadon.
 236. *H. (Hyocomium) flagellare*, *Dicks.* Wessenden !! Bolton, Todmorden.
 237. *H. (Rhynchostegium) tenellum*, *Dicks.* Helks' Wood, Gordale, Giggleswick, Bolton.
 238. *H. Teesdalii*, *Dicks.* Kilnsey, the Strid, Ingleboro'.
 239. *H. depressum*, *Bruch.* Malham, Gordale, Giggleswick, Todmorden, Helks' Wood.
 240. *H. confertum*, *B. & S.* Frequent.
 241. *H. murale*, *Dill.* Todmorden ! Castle Howard ! Ripon !! Bolton, Bingley, Studley, &c.
 242. *H. ruscifolium*, *Dill.* Frequent.
 243. *H. (Thamnium) alopecurum*, *Dill.* Helks' Wood ! Castle Howard !! Esholt, Bolton, Bingley.
 244. *H. (Plagiothecium) latebricola*, *Bry. Eur.* Todmorden.
 245. *H. pulchellum*, *Dicks.* Todmorden !! Heptonstall.
 246. *H. denticulatum*, *L.* Frequent.
 247. *H. elegans*, *Hook.* Todmorden !! Wessenden !! Esholt, Bolton, Bingley.
 248. *H. sylvaticum*, *L.* Frequent.
 249. *H. undulatum*, *Dill.* Frequent.
 250. *H. (Amblystegium) Sprucei*, *Bruch.* Gordale, Todmorden, Helks' Wood.
 251. *H. serpens*, *Dill.* Common.
 252. *H. irriguum*, *Hook.* Ingleboro'.
 253. *H. fluviatile*, *Hed.* Bolton Bridge, Ripon.
 254. *H. riparium*, *Hed.* Rawden, Esholt, Bingley.
 255. *H. (Hypnum) elodes*, *Spruce.* Stockton Forest, near York !
 256. *H. chrysophyllum*, *Brid.* Clapham, Ilkley, Yeadon, Cottingley, Rombalds Moor.
 257. *H. stellatum*, *Dill.* Cottingley ! Malham Tarn.
 258. *H. aduncum*, *L. Dill.* Wallsden Moor !! Langfield Moor !! Cottingley Moor.

259. *H. Kneiffii*, *B. & S.* Clapham Common.
 260. *H. lycopodioides*, *Neck.* Malham Moor.
 261. *H. fluitans*, *Dill.* Heptonstall! Ilkley!!
 262. *H. revolvens*, *Sw.* Malham Tarn, Ilkley, Ingleboro', Todmorden.
 263. *H. uncinatum*, *Hall.* Not uncommon.
 264. *H. commutatum*, *Dill.* Frequent; Malham, Bolton.
 265. *H. falcatum* *Brid.* = (var. *condensatum*), Shipley Glen!! Malham!
 266. *H. filicinum*, *Dill.* Frequent; Bell Busk, Clapham.
 267. *H. rugosum*, *Ehr.* Gordale, Malham, Giggleswick.
 268. *H. incurvatum*, *Brid.* Helks' Wood, Ingleton, Studley.
 269. *H. cupressiforme*, *Dill.* Frequent.
 270. *H. resupinatum*, *Wils.* Bolton Abbey!; common.
 271. *H. molluscum*, *Dill.* Bolton, Bingley, Malham.
 272. *H. Crista-castrensis*, *L.* Settle, Dentdale, Sedburgh.
 273. *H. ochraceum*, *Turn.* Todmorden, Saddleworth!!
 274. *H. palustre*, *L.* Bolton and Fountains Abbey, Gordale.
 275. *H. cordifolium*, *Sw.* Ripon, Ilkley, Yeadon, Cottingley, Rombalds Moor.
 276. *H. sarmentosum*, *Dicks.* Ingleboro'.
 277. *H. cuspidatum*, *Dill.* Bolton! Ripon, Wentvale!! &c.; frequent.
 278. *H. Schreberi*, *Willd.* "Woods and heaths."
 279. *H. purum*, *Dill.* "Woods and heaths."
 280. *H. stramineum*, *Dicks.* Todmorden, Ilkley.
 281. *H. scorpioides*, *L.* Malham Tarn, Giggleswick Tarn, Ingleboro'.
 282. *H. (Hylocomium) splendens*, *Dill.* Frequent; Bolton, Malham, Bingley.
 283. *H. brevirostre*, *Ehr.* Bolton, Helks' Wood, Malham.
 284. *H. squarrosum*, *Dill.* Frequent.
 285. *H. triquetrum*, *Dill.* Bolton.
 286. *H. loreum*, *L.* Bolton and Bingley Woods.
 287. *Omalia trichomanoides*, *Dill.* Bolton! Castle Howard!! Ripon!! Helks' Wood.
 288. *Neckera complanata*, *Bry. Eur.* Bolton Woods! Esholt, Bingley.
 289. *N. crispa*, *Dill.* Clapham! Bolton!
 290. *N. pumila*, *Huds.* Bolton! Studley, Ripon.
 291. *Hookeria lucens*, *Dill.* Frequent.
 292. *Cryphæa heteromalla*, *Brid.* Near Broughton Hall, near Skipton.
 293. *Fontinalis antepyretica*, *L.* Frequent.
 294. *F. squamosa*, *L.* Heptonstall! Hebden Bridge!! Gordale, Bolton.

DESCRIPTIONS OF SOME NEW SPECIES, SUBSPECIES,
AND VARIETIES OF PLANTS COLLECTED IN MOROCCO
BY J. D. HOOKER, G. MAW, AND J. BALL.

BY J. BALL, F.R.S.

(Continued from page 335.)

Filago atlantica, nob.—Prostrata, rami filiformes serpentes; glomeruli terminales ex foliis spathulatis approximatis pseudo-involucrati; capitula in quovis glomerulo numerosa subexserta; involucri pentagoni foliola adpressa oblongo-lanceolata, obtusa, nitida, flava dorso viridia; achenia prismatica, subfusiformia, profunde sulcata.—

Hab. In regione superiori Atlantis Majoris. In convalle Ait Mesan supra Arround! a 2200^m ad 2400^m in glareosis arenaceis.

Foliolis involucri obtusis, nec acuminato cuspidatis, et achenio diverso, a cæteris spec. e grege *F. germanicæ*, L., abhorret.

Phagnalon bicolor, nob.—Suffruticosum, radice crassa lignosa, ramis brevibus, adscendentibus, usque ad apicem foliaciis; folia oblonga, obtusa, superne cinereo-viridia, subtus albo-tomentosa; capitula terminalia, ex foliis supremis parum exserta; involucri foliola eximie bicoloria, nempe pallide flava, macula curvata purpurea notata, exteriora acuta laxè imbricata basi fimbriata, media margine scarioso-dilatata, intima acuta, cæteris longiora; achenia ex pilis copiosis vitreo-lucentia.—*Hab.* In regione media Atlantis Majoris. In convalle Ait Mesan! circa 1600^m.

P. purpurascens, Sch. Bip. in Webb Phyt. Can., habitu ad speciem nostram aliquid accedens est *P. saxatili* propius, pedunculis elongatis, filiformibus, terminalibus et axillaribus, involucri foliolis acutioribus.

Gnaphalium (?) *helichrysoides*, nob.—Perenne, cæspitosum; rhizoma crassum, lignosum, ramosum; folia conferta subrosulata lineari-oblonga vel lineari-spathulata, margine reflexa, subtus albo-tomentosa, in pagina superiori viridia et demum subglaberrima; capitulum in scapo 1-2-pollicari basi foliaceo supra bracteolato solitarium, pro genere magnum; involucri multiseriati foliola fusco-scariosa, apice rotundata, exteriora latiuscula interiora linearia subacuta; flosculi omnes tubulosi æquilongi, fæminei in series 3-6 exteriores, hermaphroditi numero variabiles interdum fæmineis subæquales, sæpius pauciores; antheræ longe caudatæ; receptaculum vix convexum, alveolorum margine demum lævi.—*Hab.* In regione superiori Atlantis Majoris. In jugo Tagherot! circa 3000^m.

Planta anomala quoad genus male definienda. Celebb. Bentham et Hooker in Gen. Plant., vol. ii., pp. 305—309 discrimen inter *Gnaphalium* et *Helichrysum* in ratione flosculorum ♀ et ♂ posuerunt, prioribus scilicet in *Gnaphalio* prevalentibus, in *Helichryso* deficientibus. Achenia in nostra pseudobicornata, ex pilis versus apicem achenii elongatis pappum exteriorem simulantibus. Hæc structura se ostendit in *Lucilia* (*Gnaphalii* grege Austro-americana) et interdum in *Gnaphalio* (*Omalotheca*, Coss.) *supino*, L. Affinitas proxima cum nostra stirpe inter *Gnaphalia* Andensia (§ *Merope* Wedd.) quærenda.

Pulicaria arabica, Coss. L. (sub *Inula*); subsp. *P. longifolia*, nob.—

Habitu a typo longe recedens, caule stricto 1-3-pedali parce ramoso, folia multo angustiora et longiora basi semiamplexicaulia vix aut ne vix auriculata, magis hirsuta, pili longiores et molliores. Habitus omnino *P. capensis* sed involucrum et achenia *P. arabicæ*.—*Hab.* In provinciis meridionalibus Imperii Maroccani. Frequens in planitie prope urbem Marocco! Mesfioua! Ourika! Mzuda! &c., semper in udis et secus aqueducta. *P. arabicam* typicam in toto Imp. Maroccano frequentem vidi etiam prope urbem Marocco, sed transitum non observavi. Specimina tamen a cl. Balansa ad Cried Biskra lecta aliquid intermedia sunt.

Anacyclus clavatus, Pers.; subsp. *A. maroccanus*, nob.—Pumilus, prostratus; flosculorum exteriorum ligulae breves, utrinque purpureis, interdum albo-marginatae, demum reflexae, paleae receptaculi apice setosae. Involucrum et achenia fere ut in *A. clavata*.—*Hab.* In calidioribus Imperii Maroccani meridionalis. Prov. Shedma!, ubi frequens, Mskala!, Mesfioua! Misra ben Kara! et prope Agadir.

Facies valde diversus, forsitan melius exploratus in specierum numerum aggregandus.

Anacyclus depressus, nob.—Planta collo radice fusiformis verticalis ramosissima, rami prostrati 1-2-cephali, apice foliosa sub capitulo non incrassati; folia alterna iis *A. nobilis* conformia; involucri hemisphaerici foliola herbacea, acutiuscula, rigida, margine non scariosa, regulariter imbricata flosculi faeminei ligulati, ligulae paucae breves erectae, atrorubentes interdum albomarginatae, receptaculi paleae induratae, longiores quam in affin. *A. maroccano* apice tantum herbaceae, pilosae, achenia exteriora anguste marginata in tantum herbaceae, pilosae, achenia interiora non marginata, omnia cum tubo dentes triangulares expansa, interiora non marginata, omnia cum tubo corollino compressa.—*Hab.* In regione superiori Atlantis Majoris. In convalle Ait Mesan! et in jugo Tagherot! a 2200^m ad 2800^m. Planta anomala a charactere generico recedens. Achenia exteriora omnino exalata gaudent nempe margine quidquam incrassato. Affinitas tamen omnino cum *Anacyclo*.

Facie *A. maroccano* nostro accedit, sed praeter achenia et folia diversa pedunculos non incrassatos *A. depressus* habet corollas regulares, dum in *A. maroccano* corollae sunt saepissime 2-aristatae ut in affini *A. clavato*.

Santolina scariosa, nob.—E basi ramosissima, ramis strictis erectis monocephalis; folia infima pinnatipartita, segmentis laciniatis, media profunde dentata vel pinnatifida, segmentis oblongo-linearibus integris, suprema minima lineari-lanceolata denticulata; involucri foliola suprema minima lineari-lanceolata denticulata; receptaculi paleae ovatae, acutae, apice dilatata, fimbriato-scariosa; receptaculi paleae ovatae, acutae, mucronatae, apice tantum pubescentes; corollae aurantiaceae.—*Hab.* In regione inferiori et media Atlantis Majoris. Ourika! Ait Mesan! In convalle Amsmiz! a 1000^m ad 2000^m.

Facies *S. oblongifoliae*, Boiss. Diagn. Pl. Or., ser. ii., fasc. 3, p. 18., sed involucri scariosis (fere *Anacycli radiata*, Lois.), paleis mucronatis, floribus aurantiacis, satis superque distincta.

Anthemis tenuisecta, nob.—Planta biennis (?), elegans, pedalis et ultra, erecto-ramosa; folia sparsa bipinnatisecta, lobis tenuibus anguste linearibus, juniora cum ramis novellis velutina, demum

viridia, pilosa; capitula terminalia, longiuscule pedunculata, pro genere parvula; involucri pauciseriati foliola obtusa, velutina; flosculi fæminei ligulis brevissimis aurantiacis aucti, hermaphroditi numerosi æquales; receptaculi paleæ flosculos æquilongæ, oblongæ, concavæ, scariosæ, apice obtusiusculæ subdentatæ; achenia curvata, exteriora profunde quinque-costata, in costis tuberculosa.—*Hab.* Haud procul urbem Marocco, in Prov. Mesfioua!

Stirps bene distincta nescio cui proxima. Ob ligulas brevissimas recurvatas videtur *discoidea*. Ab ovibus erosa, et sub pedibus conculcata specimina sæpius manca et indecora.

Chrysanthemum Maressii, Coss. in Bourg. Pl. d'Algérie, 1856, No. 198 (sub *Pyrethro*); var. *Hosmariense*, nob.—Specimina Bourgeana legit cl. Kralik altid. circa 1400^m in monte Bou Kaschba, prope Ain ben Khelil in Algeriæ meridionalis Prov. Oran. Paucis botanicis de visu cognita, nec a cel. auctore publici juris facta. Huic proximum est.

Chrysanthemum Mawii, H.f. = *Pyrethrum Gayanum*, Coss. et Dur. mss. species per regionem mediam Atlantis Majoris late diffusa.—Differt tamen *C. Maressii*, foliis simplicioribus involucri squamis obtusis, exterioribus rotundatis latiuscule scariosis, nec acutis, mediis (ex nervo producto) mucronatis, acheniis corona brevi inæquali præditis, nec omnibus auriculatis, disci auriculis flosculum æquantibus.

Planta nostra in monte Beni Hosmar! prope Tetuan, altid. 1400^m, lecta a *C. Mawii* longius recedit; foliis biternatis segmentis linearibus ad apicem ramosum annotinorum fasciculatis, pseudorosulatis, junioribus cum pedunculo sericeo-velutinis demum calvescentibus, pedunculo nudo vel folio 1 alterove lineari instructo, ligulis albis. In spec. Kralikianis folia sparsa infima biternata, sequentia trisecta, suprema simplicia, lamina linearis. Ligulæ ex ochroleuco carnea. Achenia in spec. nostris immatura ulterius exploranda.

Chrysanthemum atlanticum, nob.—Perenne, subcæspitosum; rhizoma divisum; folia radicalia fasciculata inæqualiter trisecta, lobo medio ternato lateralibus a parte exteriori auctis, laciniis ovatis vel late oblongis, omnia pilosa in pagina superiori demum calvescentia; pedunculi aphylli vel basin versus folio 1-2 trisecto instructi; involucri foliola late oblonga, apice rotundata, pallide virentia nervo obscure viridi notata, margine lato, fusco-scarioso; ligulæ latiusculæ ex albo rubellæ, subtus striis 4 saturatoribus notatæ; achenia 10-alata, alis diametrum achenii æquantibus in coronam brevem subæqualem productis. Stylus brevissime bifidus, pseudoclavatus.—*Hab.* In regione superiori Atlantis Majoris. In jugo Tagherot! et in monte Djebel Tezah! a 2400^m ad 3200^m.

Species ut videtur omnino distincta, et præter cæteras notas acheniis insignibus a *C. Mawii*, H.f., aliena. Structura fructus est tamen in *Chrysanthemis* valde variabilis et forma supra descripta—*C. Maressii*, var. *Hosmariense*, nob.—habitu inter *Chrysanthema* regionis inferioris et *C. atlanticum* medium tenet.

Chrysanthemum Catananche, nob.—Perenne, subcæspitosum; rhizoma lignosum, divisum; scapi adscendentes, infra medium

foliacei; folia parva trifida, laciniis trisectis, dentatis, simplicibusve, omnia in petiolum linearem limbo 3-4 longiorem attenuata; capitula magna solitaria; involucri foliola laxè imbricata, ovato-lanceolata, acutiuscula, dorso cartilagineo vel herbaceo parce pilosa, albo-scariosa, lucentia; flosculi pro genere pauci, fæminei longe ligulati, hermaphroditi lutei antheris breviores; achenia (immatura) costato-alata, alis 4 vel 6, exteriora pappo auriculæformi ipso æquali, interiora (disci) pappo brevi inæquali subauriculato coronata; stylus bifidus ramis demum recurvis.—*Hab.* In regione superiori Atlantis Majoris. Ex convalle Ait Mesan usque in jugo Tagherot! In monte Djebel Tezah! a 2300^m ad 3200^m.

Species insignis, decus florulæ alpinæ Atlantis. De genere non certissimus sum, dum achenia immatura etsi pluries decocta et dissecta veram structuram male ostendunt. Ligulæ color ægre definienda ex ochroleuco purpurascens, basi atrorubens.

Matricaria maroccana, nob.—Annua, pumila, e basi ramosissima; caules scapiformes, inferne foliosi; folia pinnatisecta, segmentis linearibus, sæpius alternis, integris dentatisve; involucri hemisphærici post anthesin incurvi foliola subæqualia, scariosa, biseriata, paucis brevioribus basi adjectis; flosculi fæminei breviter ligulati, disci breves steriles fertilibus intermixti; achenia sessilia, incurva, subcylindrica, lucentia (sublente) minutissime striolata, pappo caduco, auriculæformi, versus apicem dilatato, tubum corollinum æquante vel superante, coronata.—*Hab.* In prov. meridionalibus Imperii Maroccani sat frequens. Shedma! Ain Oumast! Mesfioua! Ain el Hadjar! Ain Tarsil!

Qui Genera Plantarum celeb. Benth. et H.f. vol. ii., p. 427—427 sub oculis tenet, et hanc plantam diligenter explorabit, *Matricariam* et *Cotulam* in unum genus reducendas esse facile confitebitur, si non potius tria vel plurima genera ex serie formarum constituenda censebit. Species nostra est enim hinc *Matricariæ auriculatæ* Boiss. in Diagn. Pl. Or., ser. i., fasc. 11, p. 23 (sub *Chamæmelo*), illinc *Cotulæ pubescenti*, Dsf. (*Chlamydophora*, Coss. et Dur.) arcte affinis. Prior a nostra differt habitu diverso minus ramoso, involucri subæqualiter imbricato, et præsertim acheniis facie interiore profunde 2 sulcatis (seu 3 costata) nec sulcis obsoletis sub 4-gono-cylindrica. *Cotula pubescens* differt imprimis flosculis duplo numerosioribus, exterioribus non ligulatis, involucri foliolis angustioribus, minus scariosis, pappo apice oblongo, nec dilatato, et herba pubescenti, nec subglaberrima.

Senecio Doronicum, L.; var. *Hosmariense*, nob.—Differt a typo caule breviori, foliis caulinis paucis angustis inferioribus 2-3 limbo lato in petiolum attenuatis, radicalibus late ovatis, basi truncata vel subcordata, in petiolum non decurrentibus.—*Hab.* In monte Beni Hosmar, prope Tetuan. Altid. circa 1000^m.

Achenia immatura glabra. Forsan inter subspecies hujus gregis enumeranda.

Calendula suffruticosa, Vahl—Boiss. Voy. en Esp., pl. 99; subsp. *C. maroccana*, nob.—Folia elongata, lanceolato-linearibus, acuta, integra vel in spec. macrioribus leviter repando-dentata; achenia exteriora immarginata in rostrum tenue, involucrum ter superans,

apice obtusum, producta, media margine cartilagineo pectinata, dorso cristulata, intima transverse rugosa.—*Hab.* In regione inferiori et media Atlantis Majoris. Amsmiz! Mzouda! Seksaoua! necnon in rupestribus haud procul urbem Marocco, G. Maw. Lusum foliis latioribus legimus in convalle Ait Mesan! et in monte Djebel Tezah!

Præter faciem diversam a *C. suffruticosa* dignoscitur rostro acheniorum exteriorum longiori tenuiori, margine mediorum dilatato pectinato, et foliis semper basin versus attenuatis margine non denticulatis. Pro specie propria habuerim, sed in hoc genere characteres stabiles omnino desiderantur.

Xeranthemum modestum, nob.—Affine *X. squarroso*, Boiss. Diagn. Pl. Or., ser. i., fasc. 6, p. 101 at differt insigniter hisce notis: involucris foliola exteriora angustiora, interiora anguste lanceolata mucronata (nec mutica), vix aut ne vix colorata, multo breviora (nec radiantia), paleas receptaculi integras lineares parum (nec triplo) superantia.—*Hab.* In regione inferiori et media Atlantis Majoris. Ludit erectum, 6-10-pollicare, prope Seksaoua! et minus, caule e basi 2-3 furcato, foliis latioribus basi semiamplexicaulibus, in convalle Ait Mesan! et in monte Djebel Tezah! Altid. a 1200^m ad 2000^m.

Achenia nigra, adpresse pilosa, striolata; pappi radii in setam scabram abrupte angustati, longiores paleis receptaculi æquilongi; folia (ut in *X. squarroso*) undique lanata mucrone nudo apiculata, mucro foliorum superiorum sæpe in apicem cartilagineam involucris foliolo similem productus. A *X. inaperto*, W., præter alias notas differt receptaculi paleis integris.

Carduus Ballii, Hook. f.—Planta subacaulis, e basi scapos 3-4, sæpius abbreviatos, interdum pedales, monocephalos, paucifoliatos, emittens; folia radicalia pinnatifida, segmentis lobato-dentatis margine spinosis, cum scapis parce lanata, superiora (in scapis pl. macrioris) angusta, linearia, spinoso-dentata; involucrium regulariter imbricatum, 7-9 seriatum, foliolis omnibus acutis, adpressis, nervo prominulo in mucronem producto munitis, interioribus subscariosis; pappus elongatus.—*Hab.* In clivo septentrionali Atlantis Majoris. Seksaoua! circa 1200^m; Ait Mesan! a 1700^m ad 2400^m; Djebel Tezah! a 1600^m ad 2000^m.

Carduo nullo, nisi forsan *C. Schimperii*, Sch. Bip. spec. Abyssinica affinis. Capitula magna scapi dum elongati spinulis e basi subobsoleta decurrente foliorum hinc inde armati.

Cnicus ornatus, nob.—Caulis erectus, 5-pedalis et ultra; folia radicalia bipedalia, anguste lanceolata, profunde sinuata, caulina subintegerrima, basi semiamplexicaulia, decurrentia, suprema bracteiformia, omnia pannosa, in pagina inferiori nervosa, margine ad terminum nervorum divergentium spinis validis aureis ornata; involucris foliola regulariter imbricata, dorso herbacea (sublente), margine ciliata, exteriora breviter mucronata, interiora linearia, apice scariosa colorata; achenia (nimis immatura) indescripta.—*Hab.* In Atlantis Majoris, convalle Amsmiz! circa 1300^m.

Pulchra species a *C. flavispina*, Boiss. (sub *Cirsio*), foliis et involucrio satis superque distincta et insuper spinis multo longioribus validioribusque. Proximus erit, ni fallor, species Abyssinica

nondum descripta (?) Coll. Schimper No. 51 quæ præter cæteras notas differt involucri foliolis cartilagineis, margine latiuscule scariosis denticulatis.

Cnicus chrysacanthus, nob.—Caulis erectus, 3-pedalis et ultra; folia inferiora pinnatifida, segmentis dentato-lobatis, superiora angulato-dentata, suprema bracteiformia, omnia ex pube fusca araneosa obscure virentia, spinis aureis superne sensim crescentibus armata; spinæ bractearum capitula involucrantium ultra pollicem longæ; involucri foliola irregulariter imbricata, subæqualia, exteriora mucrone longo rigido munita, interiora colorata mucrone brevi aureo apiculata; achenia (nimis immatura)?—*Hab.* In regione media Atlantis Majoris. In convalle Ait Mesan! a 1700^m ad 1900^m.

Ex spinis aureis *C. ornato* nostro subsimilis, sed involucri foliisque omnino diversus. Propior est *Cnicus polyacanthæ*, Hochst. (sub *Cirsio*), species Abyssinica, quæ differt (cæteris neglectis) involucri foliolis utrinque dentes 2-4 spinosos gerentibus.

Flora montana Abyssinica Maroccanæ nullomodo arcte affinis est. Mirum ideo quod inter *Carduineas* tres species novæ a nobis detectæ omnes proxime ad typos Abyssinicos accedunt!

Cynara hystrix, nob.—Caulis erectus, foliosus, 3-pedalis et ultra; folia inferiora longissima pinnata, pinnis pinnatifidis, laciniatis, rachi inter pinnae dentibus linearibus acutis herbaceis apice spinosis munita, superiora sensim decrescentia, omnia, præsertim in auriculis semiamplexicaulibus profunde lacinatis spinis tenuibus acutissimis armata, in pagina inferiori, cum caule tereti gracili, albo tomentosa; involucri foliola exteriora angusta adpressa, media cartilaginea e basi lata in mucronem (etiam in prefloratione) patentem acuminata, interiora recta; achenia ignota.—*Hab.* Specimen unicum legi in collibus ditionis Reraya, haud procul Mulai Ibrahim!

Plantam nostram etsi immaturam inter *Cynaras* reponendam esse nihil dubito. A cæteris mihi cognitis omnino diversa est. Foliorum et pinnarum lacinia suprema integra linearis, insigniter elongata.

Centaurea Cossoniana, nob.—*Rhaponticum caulescens*, Coss. Cat. Pl. Maroc. mss.?—Planta insignis, foliis et habitu *Rhaponticum acaule*, DC. Prod. simulans adeo ut vix dignoscitur, sed involucri structura diversissima. Foliola enim in series 8-10 æquidistantes regulariter imbricata, ovata acuta margine scarioso et apice non dilatata, intima apice elongata fimbriato-serrulata. Achenia prismatica, 5 costata, costis 5 intermediis subobsoletis. Pappi setæ demum purpureæ, scabræ, interioribus plumosis, plumulis deciduis.—*Hab.* In radicibus Atlantis Majoris. Supra Seksaoua! circa 1300^m.

Pace amicissimi auctoris nomen ineditum mutavi, et hanc speciem insignem cognomine magis apto decorare malui. Qui nobiscum animo haud æquo genus *Rhaponticum*, Lam., ad sectionem *Centaureæ* reductum a Bentham et Hooker (in Gen. Plant. ii., p. 479) observaverit, hanc speciem (a *Rhaponticis* nullo pacto divellendam) ad sententiam virorum illust. confirmandam agnoscere debet. Characterem technico est enim *Fornicio*, Coss., vel *Chartolepide*, DC., propior quam *Rhapontico*, a quo involucri et pappi setis interioribus plumosis longe distat.

Centaurea reflexa, Lam.; subsp. *C. pubescens*, Willd.; var. *Hookeriana*, nob.—*Centaurea Hookeriana*, nob. mss.—Primo intuitu a *C. pubescenti* differt capitulis multo majoribus, flosculis aurantiaco-purpureis, involucri foliolorum spina media longiori, demum recurvata, utrinque spinulosa. Habui pro specie nova, donec specimina permulta hujus gregis diligenter explorata notas específicas hucusque indicatas fallaces esse me docuerunt.—*Hab.* In planitie Maroccana ad fines Prov. Mtouga et Shedma!

Cum typo *C. reflexa*, Lam., arcte affines sunt, et meo sensu pro subspeciebus habendæ, *C. pubescens*, W.,* *C. ornata*, W., *C. saxicola*, Lag., *C. omphalotricha*, Coss. et Dur., et *C. psilacantha*, Boiss. et Held. His forsitan addendæ sunt *C. latisquama*, DC., et *C. persica*, Boiss. Hujus gregis varietas nostra regina est. Statura robusta 2-4-pedalis; capitula magna, colore ab aurantiaco ad atropurpureum variantia; achenia basi copiose sericeo-pilosa; pappus ut in *C. pubescens* longitudine mediocris, demum fuscus.

Centaurea maroccana, nob.—Planta humilis, dichotome ramosa; folia radicalia (et interdum caulina inferiora) pinnatifida, lobis angulato-dentatis; caulina lanceolato-vel lineari-oblonga, integra, acute denticulata; longe decurrentia; capitula terminalia inter folia suprema fulcrata; inflorescentia impia—(scil. rami seniores abbreviati a junioribus superati); involucri elongati foliola nitida, cartilaginea, spina valida utrinque spinulosa coronata; foliolorum mediorum spinæ elongatæ, internorum abbreviatæ; achenia matura epapposa.—*Hab.* Sat frequens in regione arida subdeserta inter Mogador et urbem Marocco.

Species fere media inter *C. eriophoram*, L., et *C. sulfuream*, W., ab utraque mihi videtur sat diversa; structura priori, facie tamen *C. sulfureæ* propior. A *C. eriophora* differt statura multo minore, capitulis minoribus dimidio angustioribus nitidis, nec basi araneoso pubescentibus, spinis foliolorum involucri validioribus. *C. sulfurea* gaudet foliolis involucri omnino diversis, appendice spinis radiantibus coronata, spina media fusca cæteras paulo longior (fere ut in § *Seridia*), dum in *C. maroccana* spina media valida est potius subpinnatim spinulosa spinulis utrinque sparsim dispositis. Nostra species est affinibus præcocior, achenia jam matura vidimus dum *C. sulfurea* nondum florebat.

Carduncellus lucens, nob.—Aproxima *C. monspeliensium*, All., differt foliis et involucri squamis magis spinosis, spinis longioribus albis lucentibus, et achenio (nondum matura) lævi nigro, nec corrugata grisea. Folia primaria integra ciliato-spinosa, sequentia pinnatipartita, lobis eximie pectinato-spinosis; involucri foliolorum appendix late scarioso-pectinata, intimorum anguste marginata.—*Hab.* In regione superiori Atlantis Majoris. In convalle Ait Mesan! a 2000^m ad 2540^m.

Species ulterius exploranda; achenia nostra nimis immatura.

Pieris albida, nob.—Planta ramosa, decumbens; folia inferiora

* Si *Centaurea pubescens* W., est eadem ac *C. incana*, Dsf. Fl. All., sicut ipse Willdenovius suspicatus est, nomen Fontanesianum ad hanc speciem vel subspeciem revocandum erit. *C. incana*, Ten., et *C. incana*, Lag., sunt enim nomina recentiora.

lyrato-pinnatifida, superiora angusta, basi semiamplexicaulia; pedunculi bracteati; capitula pro genere parva; involucri foliola exteriora dorso subindurato, interiora viridia pappum æquantia; ligulæ albidæ, longiusculæ (exsiccatae ochroleucæ), exteriores dorso purpurascentes; achenia omnia pappo plumosa coronata, rostro longiusculo ipso achenio subæquali.—*Hab.* Hinc inde in planitie Maroccana. Prope Sheshaoua! Mzouda! Seksaoua! et alibi.

Ex acheniorum structura ad § *Eupicris* adjungenda, facie potius ad § *Spitzelia* subsimilis et præsertim ad *P. cupuligeram*, Dur. in Expl. Alg., quæ verosimiliter est *P. pilosæ*, Del., mera varietas. Nostra species proxima est *P. campylopodæ*, Boiss., et *P. longirostræ*, Sch. Bip. Prior differt habitu erecto, foliis sinuato-dentatis indumento minus rigido.

In *P. albida* indumentum in herba tota biforme, ex pube brevi et setis rigidis apice non glochidiatis.

Crepis taraxacifolia, Thuill. DC. (sub *Barkhausia*); subsp. *C. stellata*, nob.—Differt a typo caule minus ramoso oligocephalo, foliis magis hispidis, involucri foliolis exterioribus angustioribus, valde inæqualibus magis adpressis, interioribus margine membranaceis, post anthesin concavis stellatim expansis, receptaculo minus piloso.—*Hab.* In provinciis meridionalibus Imperii Maroccani, sat frequens. Haha! Tasseremout! Urika! Seksaoua! Ait Mesan! usque 1400^m.

Forma Maroccana *C. taraxacifoliæ* habitu diverso, potiusquam caractere tecnico, distinguenda. Achenia foliolis involucri subæqualia; exteriora foliolis adhærentia.

Crepis (§ *Omalocline*) *Hookeriana*, nob.—Rhizoma perenne, crassum, sæpius furcatum; folia omnia radicalia, hirtula, lyrato-runcinata, lobis triangularibus acutis, sæpius denticulatis; scapus 4-8 pollicaris, adscendens, indivisus, medium versus bracteola lineari instructus; involucri foliola exteriora angusta, interiori nigrescentia, apice ciliolata, lana brevi plus minusve adspersa; receptaculi foveolarum margo membranaceus lacero-ciliolatus; ligulæ flavæ dorso rubellæ; achenia elongata, non compressa, lævia, vel oculo armato tenuissime asperula; pappi nivei setæ scabriusculæ.—*Hab.* In regione superiori Atlantis Majoris, in monte Djebel Tezah! a 2400^m ad 3000^m.

Species probe distincta, affinis *C. oporinoide*, Boiss. Voy. en Esp. ii., p. 388, tab. cxvii. In hac scapus foliaceus, bifurcatus; folia pinnatifida, glabra, seu rarius parce lanata (nec hirtula), segmentis subæqualibus, lineari-lanceolatis, obtusiusculis, supremo elongato; margo foveolarum receptaculi brevissimus, vix membranaceus, sublente minutissime ciliolatus. Celeb. Boissier *C. oporinoidi* suæ pappum plumosum et achenia compressa tribuit. In speciminibus plurimis a me exploratis pappi setas simplices sublente asperulas, et achenium maturum subcylindricum, nec compressum semper observavi. *C. cæspitosa*, G. G.; Moris (sub *Barkhausia*) facie plantæ nostræ simillima differt acheniis rostratis cæterisque notis.

Hypochæris leontodontoides, nob.—Radix crassa, subverticalis, divisa, ad collum foliis emarcidis vestita; folia rosulata, obovato-spathulata obtusa, vel obverse lanceolata acuta, repando-

denticulata, subglaberrima, vel pilis crispis simplicibus vestita; scapi breves filiformes; involucrium paucifoliolatum, subregulariter imbricatum, extus pubescens, foliolis exterioribus interdum pilis paucis longioribus fuscis munitis; receptaculi paleæ hyalinæ, apice setiferæ, coloratæ, achenia (juniora) excedentes; pappus ex radiis 10 longioribus deciduo-plumosis basi parum expansis, cæteris (fere 10) dimidio brevioribus inter priores extus adjunctis; achenia nimis immatura ulterius observanda.—*Hab.* In regione superiori Atlantis Majoris. In convalle Ait Mesan! et in jugo Tagherot! a 2400^m ad 3200^m.

Species insignis nulli proxima, primo intuitu inter *Leontodontes* adscribenda.

Leontodon hispanicus, Merat; subsp. *L. Ballii*, Benth.—Differt a typo hisce notis. Indumentum biforme, ex setis rigidis apice furcatis vix uncinatis, et pube brevi araneosa; scapi breves, bracteis 1-2 linearibus instructi; involucrium minus regulariter imbricatum, foliolis interioribus paucis latiusculis; ligulæ extus rubellæ; receptaculi foveolæ margine brevissimo membranaceæ non ciliatæ; achenia apicem versus attenuata sed vix aut ne vix rostrata, subtiliter corrugato-asperula (nec muriculata) pappi setæ inæquales, longiores plumosæ breviores setaceæ.

Legi in Atlantis Majoris convalle Amsmiz! circa 1400^m.

Pro specie omnino distincta habuerim nisi tot tantosque lusus in hac grege observaverim. Ne dicam de notis specificis, characteres etiam generis nullomodo stabiles sunt. Inter specimina *L. hispanici* ad Fuente de la Higuera lecta (Bourgeau Pl. d'Espagne No. 1600) achenia exteriora incurva extus farinacea nec costato-striata pappo brevissimo fimbrillifero coronata omnino ut in *Picride lyrata*, Del.

Leontodon (§ *Deloderium*) *trivialis*, nob.—Radix indurata, annua vel biennis, caules (vel potius scapos) plurimos emittens folia radicalia, lineari-oblonga vel lanceolata, profunda dentata rigida, subglaberrima vel pilis simplicibus hispida; scapi glabri 1-3-cephali, aphylli; involucrium imbricatum, demum subcylindricum; receptaculum fimbriatum; achenia in rostrum semetipsis subæquale sensim angustata; cætera ut in § *Deloderium*.—*Hab.* In ruderatis Imperii Maroccani meridionalis, ut videtur sat frequens. Legi in Prov. Shedma! prope Mtouga! et specimen vidi in ditione Mesfioua lectum a celeb. J. D. Hooker.

Planta humilis; specimina sæpissime erosa vel sub pedibus conculcata. Ab affini *Apargia annua*, Vis. Pl. Æg. et Nub., p. 38, tab. 6, cæteris prætermisissis differt achenio longe rostrato nec erostri. *Crepis hispidula*, Del. (*Leontodon Delileanus*, nob.), differt achenio apice in rostrum sibi duplo longius abrupte angustatum.

Sonchus tenerrimus, L.; var. *tuberculatus*, nob.—A typo differt insigniter acheniis rugoso-tuberculatis, brevioribus et simul majoribus, et insuper capitulis majoribus, ligulis aurantiacis, foliis minus profunde pinnatifidis, caulinis basi grosse auritis.—*Hab.* In rupibus arsis insulæ Mogador!

In copia magna speciminum *S. tenerrimi* (speciei summopere ludibundi) achenia nostris similia nunquam observavi.

Sonchus fragilis, Ball in Herb. (1852)—*S. tenerrimus*, L.; var.

pectinatus, Coss. in Bourgeau Pl. d'Algérie (1856, No. 84).—Radix crassa, suberosa, caules breves foliosi; folia pinnata, segmentis subalternis, ovato-rotundis, acutiusculis; pedunculi breves apice non floccosi; involucri foliola et ligulæ latiores quam in *S. pectinato*; achenia vix, aut ne vix, compressa, 4-5 costata, tam in costis quam in interstitiis lævia.—*Hab.* In rupibus juxta urbem Tetuan. Legi anno 1851 et iterum 1871.

Acheniis diversissimis præter habitum singularem a *S. tenerrimo* optime dignoscitur. Si ullo alio foret *S. maritimo*, L., magis affine; sed in hoc achenia 8 costata.

Genus *Sonchus* est in ditione Floræ Maroccanæ valde ludibundum. Formas plurimas serius evulgare proposui. Inter alias notanda est *Sonchus tenerrimus*, L., var. *arborescens*, Salzm. Exsicc. planta 6-8-pedalis var. *insignis* nisi potius subspecies (?).

Jasione cornuta, nob.—Annua; caulis subsimplex in pedunculum nudum desinens; folia lineari-lanceolata, acuta, repando-dentata, superne vix decrescentia; involucri foliola 8-9, e basi lata ovata longe acuminata, flores longitudine superantia recurva, cum foliis et caule ciliato-pilosa; pedicelli cum calycibus glaberrimi; laciniæ calycinæ angustissimæ in setas capillaceas floribus æquilongas productæ; capitulum pro genere magnum.—*Hab.* In prov. meridionalibus Imper. Maroccani, sat frequens. Haha! Shedma! Ourika! Reraya! Mesfioua!

Species ex involucri foliolis cornuformibus insignis.

Jasione atlantica, nob.—Perennis; caules numerosi prostrati, ramis elongatis debilibus, sterilibus dense foliosis, floriferis superne nudis; folia obovato-lineararia, obtusa, brevia; involucri foliola 12-13 ovata margine undulata cum foliis et pedunculo glaberrima vel pube tenui leviter adspersa; pedicelli cum calycibus glaberrimi; laciniæ calycinæ brevis vix quartam partem corollæ longitudine attingentes.—*Hab.* In regione superiori Atlantis Majoris. In convalle Ait Mesan! a 2000^m ad 2500^m.

A *J. amethystina*, Lag. et Rod., præter indumentum diversum differt laciniis calycinis multo minoribus.

Echium modestum, nob.—Radix annua, tenuis; caulis erectus, tenuis, spithamæus parce ramosus; folia lineari-oblonga, acutiuscula pube brevi setis longioribus intermixta vestita; inflorescentia scorpioidea subsimplex, rarius ramosa; bracteæ parvulæ calyce hirsuto breviores; corolla cærulea, pubescens, calyce duplo longior; antheræ exsertæ.—*Hab.* Frequens in regione arida Imp. Maroccani meridionalis—Shedma! Ain Oumast! Mesfioua! Mtouga! Seksaoua! Agadir.

Characteribus supra citatis et habitu diverso ab *E. setoso* diversum. *E. maritimum*, W., præter alias notas differt staminibus inclusis. Nuces in pl. nostra superne acuminatæ, tuberculatæ, costis elevatis, præditæ.

Anchusa atlantica, nob.—Radix biennis; caulis erectus, simplex, foliosus; folia lanceolata, inferiora in petiolum latum attenuata, superiora sessilia, semiamplexicaulia; inflorescentia composita, ex racemis in axillis fol. superiorum ortis; corolla regularis, ochroleuca, (in spec. nostris) hexamera; stylus inclusus; germen (immaturum) læve.—*Hab.* In regione media Atlantis Majoris, convalle Ait Mesan! a 1900^m ad 2000^m.

Ob fructum immaturum quoad genus haud omnino certum, habitus tamen *Anchusæ* nullæ proxime affinis nisi forte spec. Abyssinicae—*A. affinis*, R.Br. Planta tota molliter hispida; indumentum biforme ex pilis brevibus aliis longioribus patulis intermixtis.

NOTES ON SOME PLYMOUTH PLANTS, WITH STATIONS.

By T. R. ARCHER BRIGGS, F.L.S.

Ranunculus hirsutus, Curt.—Plentiful and apparently indigenous in damp waste spots and in a marsh below Kilna Lane, Tideford, E. Cornwall, June, 1873.

Aconitum Napellus, Linn. — Not indigenous anywhere about Plymouth, but now to be seen growing plentifully on top of a low-lying hedgebank a few gunshots from the farmhouse of East Sherford, Brixton, extending for about a dozen yards on top of the bank, and also for about one on the side of a gutter below. A little way above is a pit made to receive refuse from the house or garden, and thence the plant may have been brought by water to the side of the gutter, whence it would be likely to be cast up on the hedgebank on the gutter being cleared. On an adjoining hedgebank bounding an orchard *Chrysanthemum Parthenium* occurs, and in the orchard patches of the double-flowered garden Daffodil.

Trifolium hybridum, Linn.—Now quite established by many roadsides about Plymouth, in both Devon and Cornwall. Near the village of Antony, in the latter county, I have observed it for the past twelve years, so it doubtless renews itself by seed.

Lathyrus sylvestris, Linn.—Rare near Plymouth, where I have seen it only in spots by the coast and on the cliffs on both sides of the estuary of the Erme.

Polycarpon tetraphyllum, Linn.—Sparingly in two spots at the village of Newton Ferrers, in front of the houses above the tidal inlet. *Erodium moschatum* occurs here also, and in another spot *Malva rotundifolia*, an uncommon plant in S.W. Devon. The *Polycarpon* still grows at its other local station, King's Tamerton, whence I recorded it in Journ. Bot., vol. iv., p. 289.

Adoxa Moschatellina, Linn.—One of those species remarkable for having a markedly local range. Quite common in some parishes here—Egg Buckland, for instance—but in others rare or absent. In Cornwall I have seen it only in that of Botus Fleming, where it grows sparingly in two lanes.

Sambucus Ebulus, Linn.—On the brow of a low cliff by the cove below Mothecombe village, growing with bushes of *Ulmus campestris* and extending a little way from them into the field adjoining. In a hedge near are bushes of *Castanea vesca*, and I consider that the *Sambucus* can only fitly go into the "denizen" class. In the village *Geranium pratense* has established itself sparingly in a waste corner, near the entrance to the old Manor House.

Leontodon hispidus, Linn.—Like *Adoxa*, remarkably local. Plentiful

near Roborough [in the parish of Tamerton Foliot, and occurring by the tramway at Common Wood and near Widey in the adjoining parish of Egg Buckland, as well as in a few other places near Plymouth, but quite absent from extensive tracts of country in S.W. Devon; and I have not as yet seen it anywhere in Cornwall.

Barkhausia taraxacifolia, DC. Prod.—This still grows at Laira, whence I sent it to the Bot. Ex. Club some years ago, and now occurs elsewhere near Plymouth; indeed it seems to be spreading so fast as to bid fair to soon become quite a common weed. In May last I found it at Cattedown on limestone rubble, looking like a recent introduction, though there were two or three dozen plants. During the past summer it also grew abundantly in a stony waste spot at Knackersknowle, where extensive works were carried on a few years ago during the erection of the forts around Plymouth, and thither it is likely enough to have been brought with the corn supplied to the horses employed on the works. It moreover occurred by the Saltash and Callington Road in S.E. Cornwall, scattered by the roadside for a quarter of a mile or more between the town of Saltash and Carkeel.

Taraxacum officinale, var. *palustre*, DC.—This variety of the Dandelion seems to be common and widely distributed about Plymouth, although it has been supposed to be rare in this part of England. I have noticed it at Cattedown, between Lipson and Laira, at Newnham, on the southern border of Dartmoor near Cholvich Town, &c.; and in E. Cornwall, near St. John's.

Arctium majus, Schkuhr.—A single plant near Hessenford, by the road leading thence to Seaton Sands, July, 1873. New to Cornwall.

Bidens cernua, Linn.—When I drew up my paper "On some Peculiarities in the Botany of the Neighbourhood of Plymouth," inserted in Journ. Bot., vol. i. N.S., pp. 141—146, I supposed that this was not to be found anywhere within twelve miles of this town, and so put "absent" against it; but in July last I found it growing plentifully near Hessenford, in a swamp by the little river Seaton, associated with *Menyanthes trifoliata*. This spot is about eleven miles from Plymouth.

Orobanche Hederæ, Duby.—Two or three plants on Ivy, growing over an old limekiln at Cattedown, 1872. Never before recorded from any spot near Plymouth.

Echinosperrum Lappula, Lehm.—On August 5th, 1873, I found a single specimen of this by the Torpoint and Liskeard turnpike-road, near Wackar Mill. Probably the seed was brought with imported corn and cast out with "siftings" or refuse—a supposition strengthened by the fact that I have seen *Bromus secalinus* just at the same spot.

Plantago media, Linn.—On the lawn of Wembury House, Devon, in considerable quantity, September, 1873.

Rumex pratensis, M. & K.—Scattered widely over the country about Plymouth, growing in waste spots with other species of the genus. I only discovered it recently, but can already record it from Oreston, Hove, Blaxton, and Stoke Damerel, in Devon; and from Torpoint, between Burraton and Notter Bridge, and near Hessenford, in Cornwall.

Scilla autumnalis, Linn.—In abundance in shallow soil on a rocky point at Gurrows Down, Revelstoke, above the western extremity of Bigbury Bay, August, 1873.

ON PTEROCARYA STENOPTERA, *Cas.DC.*

BY HENRY F. HANCE, PH.D., &c.

SOME five or six years ago the Rev. R. H. Graves, of the American Baptist Mission, gathered, during an excursion into the province of Kwangsi, a few small winged fruits, which he gave to Mr. Sampson, who sowed them, and was gratified to find one come up and grow vigorously. The plant was an object of much interest to me, and of some fruitless speculation as to its affinity, from the time it was a foot high. A solitary nut, accidentally found by Mr. Sampson, in a drawer, at the beginning of 1872, enabled me, however, to ascertain that it is Juglandaceous, and I thought very likely referable to *Pterocarya stenoptera*, *Cas.DC.*, a tree discovered somewhere in Southern China by M. Calléry, the sinologue and missionary, in 1844. Being desirous of settling the question authoritatively, I sent a brief description of the leaves, and a sketch of the fruit, to M. Charles Naudin, the eminent student of hybridity, and monographer of the *Melastomaceæ* and *Cucurbitaceæ*, at present residing at Collioure, in the Pyrénées Orientales, with a request that he would be so kind as to engage one of his former colleagues in the Paris Muséum d'Histoire Naturelle to compare the drawing with the original specimens preserved there. This verification was entrusted to M. Bernard Verlot, Chef de l'Ecole Botanique, well known as the author of the "Guide du Botaniste Herborisant," who was so obliging as to detach for my use about a dozen fruits from Calléry's own specimens.*

* In transmitting these, after expressing an opinion as to the probable identity of the plant I was enquiring about with that described in the "Prodromus," M. Naudin proceeds:—"Cependant, M. Verlot me fait observer que les échantillons-types de Calléry et de Casimir de Candolle n'ont pas le rachis ailé, caractère qu'on retrouve au contraire dans les *Pt. caucasica* et *fraxinifolia*. D'un autre côté, les fruits de ces derniers ont les aîles beaucoup plus longues [? larges] que celui du *stenoptera*. D'après M. Verlot, votre espèce tiendrait en quelque sorte le milieu entre les *Pt. caucasica* et *fraxinifolia*, d'un part, et le *Pt. stenoptera* d'autre part. Reste à savoir si un rachis ailé ou non est un caractère suffisant pour séparer spécifiquement des plantes qui se ressemblent tant sous d'autres rapports." There is some confusion here on M. Verlot's part; and, as I notice that the late M. Arthur Gris fell into a similar mistake, in his "Mémoire sur la Moelle des Plantes Ligneuses" (*Ann. Sc. Nat., Bot., sér. 5, xiv., 67*), I am probably right in surmising that the Circassian tree is cultivated under two names in the garden of the Muséum, an error of common occurrence in collections. *Pterocarya caucasica* and *Pt. fraxinifolia* are simply two names for the same plant, not even for forms or varieties of one species. The first was given, in 1824, by Kunth, who founded the genus on Michaux's *Juglans pterocarpa*; but, as the tree had been named *Juglans fraxinifolia* by Lamarck a few years previously, M. Spach rebaptised it, in 1834, *Pterocarya fraxinifolia*. Those who regard the Paris "Congrès International de Botanique" as a scientific Œcumenical Council, the decrees of which were inspired by a kind of divine afflatus, will, of course, in obedience to Article 57 of the "Lois de la Nomenclature Botanique," promulgated by that august assembly, adopt the latter name. Botanists of a Janus or Quirinus-like turn of mind, however, like the humble writer of this article, who look on this decision of the "Patres" as mischievous, because needlessly and arbitrarily adding to the synonymy of our science, by the resuscitation of "obsoleta et extincta nomina, sub alienis et sæpe falsis nominibus genericis proposita," as Fries excellently

During last summer the tree at Canton, which was removed by Mr. Sampson some time since to the Public Garden in the Foreign Settlement, flowered very freely, and has ripened abundance of fruit; and a comparison of these with the authentic specimens for which I am indebted to M. Naudin's good offices, leaves no shadow of doubt that it is identical with that of Calléry, who resided at Macao, and, if I mistake not, did not travel beyond or even to any great extent within Canton province. Mr. Robert Swinhoe sent me a specimen of the same plant from the hills in the neighbourhood of Ningpo, where also it was met with by the late Mr. Oldham. The general affinity between the Ningpo and Japanese Floras, and the occurrence in the former district of *Platycarya*, led me to suspect the identity of the Chinese species with one or other of the two imperfectly characterised by Zuccarini.* M. Maximowicz has, however, quite recently shown in a most valuable review of East Asiatic *Juglandceæ*,† that these are reducible to one, which differs from its Chinese congener in various points of structure, and was confounded by the late Prof. Miquel‡ with a *Juglans*.

The tree in the Canton Garden, which has now attained a height of nearly twenty feet, has rather pale bark, assuming, as the trunk grows, a rough coarsely reticulated fibrous appearance; graceful spreading branches; and handsome foliage, which exhales, especially if drawn through the hand, a balsamic odour, blended with a decided *soupeçon* of bugs, so that it occupies the debatable ground between the grateful and the disagreeable. The leaflets, borne in 5 to 7 pairs, increasing gradually in size from the lowermost which are much the smallest, are oval, oblique at the base, rounded at the apex, and with sharp shallow serratures, except the basal portion, which is entire: the rachis in the living plant is as conspicuously winged as that of *Rhus semialata*, Murr. The peculiarity of gemmation noticed by M. C. de Candolle§ occurs in our tree; and the well-known chambered pith of the Walnut is found even in the slender branchlets. The female flowers, thinly clothed with pale ferruginous elæagnoid scales, are borne in pendant spikes 5 to 6 inches long at anthesis, increasing to 8—10 inches when in fruit, the lower 2 inches of the rachis devoid of blossoms. Each flower is subtended by an ovate

observes (Præf. in Mantis. Novit. Flor. Succ.), will hold to the first. The Horatian prediction,—

“ Multa renascentur quæ jam cecidere, cadentque
Quæ nunc sunt in honore vocabula,”

will be too true of great numbers of our specific names, if this law is to be made binding. “ Debemur morti nos nostraque ”; and these dry bones may surely be left undisturbed. As regards M. Verlot's statement that Calléry's specimens have a wingless rachis, I may remark that, in the growing plant, the wing is quite conspicuous; but that it contracts and curls up so much in dried specimens that unless specially looked for, or known to exist, it would not be observed; and not ever then, sometimes, unless the leaf is softened in warm water.

* Abhandl. d. math.-phys. Kl. d. k. Münch. Akad. iv., 2, 141.

† Mém. Biolog. Acad. St. Pétersb. viii., 638.

‡ Ann. Mus. bot. Lugd.-Bat. iii., 207.

§ Mémoire sur la Famille des Juglandées, in Ann. Sc. Nat. 4^e sér. xviii., 11.

acuminate bract, about half a line long, which does not grow as the fruit ripens. The wings at this period scarcely overtop the flowers, to which they form lateral shields, being directed outwards. There is hardly any style, properly speaking, but the large pink papillose stigmata, dilated and irregularly laciniate at the apices, project conspicuously, and are recurved over the lanceolate bluntish lobes of the inner perigone. There is nearly always more or less torsion in the position of these stigmata, which seldom appear to lie in the same plane with the axis: they are, moreover, persistent in fruit, not deciduous, as stated in M. Casimir de Candolle's character of the genus. The fruit is obscurely costate, rounded on the posterior surface, flattened on the anterior* one, so as to be of a semi-ovate form, like the mericarps of some *Apiaceæ*, and is not attenuated at the apex, as in *Pt. caucasica*, with a wild American specimen of which I have carefully compared it. On the removal of the fibrous epicarp, the bony putamen is found to be ovoid, shortly mucronate at the top, and with moderately prominent ribs; whilst that of *Pt. caucasica* is wider, more depressed at the apex, the mucro is ancipitous, and much widened at the base, and the ribs are more conspicuous and projecting. It is 4-celled at the base, but at the middle the cells are confluent into a single one, of a wide horse-shoe form in the transverse section; and it resembles that of *Pt. rhoifolia* (as described by Maximowicz) in being destitute of the *lacunæ* found in *Pt. caucasica*.† The wings are of equal size, attached from the base to the summit of the flattened face of the nut, and diverge at an angle of about 62° , their free portion being rather longer than the nut (5-6 lines long, 2 lines wide), oblong, and more or less truncately rounded at the apex. Their nervation is rather less conspicuous than in *Pt. caucasica*, chiefly because the wing is thicker in texture; and the veins are very much closer, and either simple, or with one or two parallel ramifications. The catkins are solitary, $1\frac{1}{2}$ to 3 inches long, and many-flowered. The structure of these ♂ flowers is somewhat remarkable. Each consists of a linear flattened receptacle, about a line and a half in length, bearing, at a short distance from its insertion, on the posterior surface, 10—12 stamens, with very short filaments, disposed in three or four rows: these readily become detached, leaving small blackish scars. There are no perigone-lobes along the sides of this disc, but at its very extremity are three small oblong free *phylla*, two lateral and one terminal, the latter with a minute ovate bract outside of and closely appressed to it. My excellent friend Dr. Thwaites, to whom I sent some catkins, was "disposed to consider each anther to represent a flower, and the body termi-

* The terms anticous and posticous have been so confused (*cfr.* Germain de St. Pierre, *Nouv. Dict. de Bot.*, 67) that I have preferred using these, which I understand in the sense of M. Casimir de Candolle (*Théorie de la Feuille*, 4), *viz.*, *posterior* as situated nearest to, *anterior* furthest from the axis.

† On this difference, Maximowicz observes:—"Lacunæ periphericæ coccæ in planta caucasica vulgo distinctissimæ, interdum etiam obsoletæ occurrunt, ita ut character e lacunis petitus non tam gravis videatur ut volunt palæontologi." (*Op. laud.*, 639.)

nating each rachis [*i.e.*, what I have called receptacle] an abortive leaf-bud, or so many abortive female flowers as there are bracts"; but he added, that this was not given as a fixed opinion, as the matter required much research and consideration. I believe, however, a consideration of the various differences in the male flowers of the other Juglandaceous genera will suffice to show the untenableness of this view, which is not supported by any approach to an analogous structure in the whole order. To me it appears most probable that each flower must be regarded as consisting of a staminiferous disc soldered with a pedicel; and that, while the anterior and two innermost lateral lobes of the perigone are suppressed, the three foliaceous processes at the extremity of the receptacle represent respectively the anterior and two outermost lateral perigone-lobes, the two latter being considered by M. Casimir de Candolle as *prophylla* of the bract. By the diminished number of the perigone-leaves, and the 3-4 seriate arrangement of the stamens, the Chinese species approaches *Carya*. If the bract must be regarded theoretically as the organ in the axil of which the flower arises, it appears evident in the present case, from its perfectly ovate form, that it has been bodily carried up, from the axis of inflorescence or rachis of the catkin, by the pedicel; for that the flower is soldered with a stalk I think its abnormally elongated shape, and the existence of an interval between the space occupied by the stamens and the junction of the receptacle with the axis of the catkin, go far to prove. And it may be worthy of consideration whether, in other instances within the order, the unusual shape of the flower is not explicable in a similar way.*

By the structure just described, the Chinese species differs so much from its Caucasian relative that it will be convenient to regard it as constituting a special sub-genus, for which I propose the name of *Eocarya*, and which may be thus succinctly characterised:—

Floris masculi perigonium triphyllum, phyllo anteriore bractea parva ovata arcte suffulto, binis lateralibus ei approximatis. Stamina 10—12, toro nudo ligulato (apice phylla perigonialia gerente) insidentia, tri-quadri-seriata. Fl. fem. Stigmata persistentia. Nux basi 4- a medio 1-locularis, lacunis omnino nullis; utrinque ala adscendenti, eam haud velante, secus margines faciei anterioris a basi apice fere tenus affixa, aucta.

P.S.—Since the above was written, I have received, through the kindness of M. Maximowicz, a specimen of *Pt. rhoifolia*, S. & Z. From the examination of an immature fruit, the Japanese tree, by the texture, venation, oblique insertion, and wideness of the wings, and the general shape and longer conical free summit of the nut, appears to me much more nearly akin to *Pt. caucasica* than the Chinese species.

* Endlicher describes the stamens as "receptaculo complanato cum bractea hypocalycinæ nervo medio confluenti inserta" (Gen. Pl., 1126); and Parlatores, "Stamina toro bractea nervo medio adnato inserta" (Fl. Ital. iv., 205); but this scarcely suffices as an explanation of the floral structure of the Chinese species.

SHORT NOTES AND QUERIES.

IMPORTANT CORRECTION IN MR. NATHORST'S PAPER, pp. 225—228.—The valuable observations of Mr. Nathorst regarding the discovery of boreal plants in the post-tertiary beds of England, and the relation of this discovery to the climate, have been obscured by the erroneous transcription of Mr. Nathorst's manuscript in the last paragraph. The specimens of *Salix polaris* and *Hypnum turgescens* were obtained at the locality between Mundesley and Cromer immediately *underneath*, not as stated *above*, the boulder clay. And to make the references that follow stratigraphically accurate, the words "somewhat higher up in the beds, and," in the tenth line from the bottom of page 227, must be omitted, as well as the word "down" in the last page of the article.

CAREX PARADOXA, Willd., IN MIDDLESEX.—I believe that this species, which is but little known to collectors, has not hitherto been recorded from any counties in England but Yorkshire, and perhaps Norfolk or Suffolk, but it is impossible to refer to any other species a *Carex* collected by Mr. Warren last July by the canal at West Drayton. The late Mr. Salter's fine drawing, E.B. Supp. 2896, was made from Irish specimens, where the plant grows in Co. Westmeath. The only fault in this plate lies in the dark sheaths at the base of the stem being represented as stiff and entire. In the Middlesex plant these are frayed out into dark brown fibrous coverings to the stems, a point insisted on as characteristic of *C. paradoxa* by Koch and other Continental authors. Of course the best characters are found in the fruit, which is very gibbous at the base and wingless; there is absolute identity in the Middlesex and Yorkshire plants in this respect.—At the same place Mr. Warren gathered *Carex axillaris* in very characteristic condition, a new locality for the county.—HENRY TRIMEN.

PLANTS OF CO. CORK.—*Cerastium semidecandrum*; I have good reason to believe that the stations hitherto recorded in Cork for this species are erroneous, and that *C. tetrandrum* was the plant really found. Last May, however, I noticed *C. semidecandrum* in great profusion growing on sandy ground at Claycastle, Youghal, and on sandhills near the mouth of Fannisk river.—*Bromus commutatus*, Schrad., a grass very rare with us, was found near Youghal, in a marshy meadow. It was also noticed last summer in Ballyphehane Bog, very luxuriant, by Mr. I. Carroll. I may add that *B. secalinus*, Linn., perhaps only a "colonist" with us, was found in two or three new stations last summer by Mr. Carroll.—At Youghal also I last season found (a second time after the lapse of five years) a plant of *Medicago maculata*, a rare and doubtful native I fear.—For *Briza media*, L., every station hitherto recorded was open to grave suspicion, as the plant never appeared in a really wild locality, but in lawns or pastures lately sown. This summer I found it, however, on a steep, rough descent, far from houses, forming the side of a glen where cultivation seemed almost impossible.—I have two new stations for *Filago minima*,

a very rare species with us:—near Ballinadee Creek, by the Bandon river, on slaty refuse; and near Union Hall, in the extreme west of the county.—I may close these notes by remarking that the Corsican Mint, *M. Requierii*, still flourishes abundantly in the lonely street of Castle Townsend village.—T. ALLIN.

CAREX TOMENTOSA.—I noticed this plant this summer to be gradually disappearing at Marston Maisey, Wilts, from drainage of the water meadows there.—T. B. FLOWER.

LYCOPodium INUNDATUM.—This species of Club Moss, very rare in Ireland (hitherto found in Connemara only), I have found growing plentifully in the townlands of Ardkitbeg and Ardkitmore, parish of Desertserges, Co. Cork.—CHARLES LONGFIELD.

PETASITES HYBRIDA IN JERSEY.—I found in the month of April, 1871, *Petasites officinalis*, Moench., f. *fœminea* (*Tussilago hybrida*, L.), in the grounds of Longueville Manor, St. Saviour's, Jersey. As that plant is not to be met with in the "Primitiæ Floræ Sarnicæ," I hope you will be so kind as to relate the discovery in the "Journal of Botany," where so much attention is paid to the Channel Islands Flora.—EUG. FOURNIER.

CLIMATE AND VEGETATION OF SMITH'S SOUND (see pp. 340, 341).—The winter quarters were in a harbour called "Thank God" Bay, in latitude $81^{\circ} 38'$ N. and longitude $61^{\circ} 44'$ N., which the *Polaris* reached on September 3rd. . . . The climate of the winter quarters was found to be much milder than it is several degrees further South. In June the plain surrounding "Thank God" Bay was free from snow; a creeping herbage covered the ground, on which numerous herds of musk oxen found pasture; and rabbits and lemmings abounded. The wild flowers were brilliant, and large flocks of birds came northward in the summer.—MARKHAM, "Threshold of the Unknown Land," pp. 201—202.

VEGETATION OF LITTLE NAMAQUA LAND, SOUTH AFRICA.—I had a better idea of a "carpet" of flowers in many places than I ever before possessed. Composites and Mesembryanthemums occupied most of the ground for miles and miles, with numerous *Oxalideæ*, quite different from Cape Town species. I send you a specimen of a delicate primrose-coloured flower which grew in lovely masses all over the hot sandy spots [*Grielum tenuifolium*, L., Rosaceæ]. It was wonderful to go through such an extent of western Cape country and not see a single Heath, *Protea*, or Orchid of any kind! Stapelias were widely distributed, but usually rather difficult to find, as they have a way of growing right in the middle or under the shelter of other plants, commonly a shrubby *Mesembryanthemum*. Sir H. Barkly got a number of species alive (about 15—17 he thinks) for Kew; but only two were in flower, so that it is difficult to determine the number found.

The Hottentots call them "Arūna," and *eat* the greater number of them. . . . The great "Kokerboom" (or Quiver Tree), *Aloe dichotoma*, was, however, the most striking vegetable production of the country, attaining a diameter of 4 feet in the stem in full-grown individuals. It abounds in the hilly and mountainous parts, and is quite a feature in the scenery. In habit it is very variable, being by no means strictly dichotomous in all cases. Often a collection of slightly divergent stems have a common base, as if a number of individuals had grown together; but the majority are single thick trunks. Some of the thicker round-headed old plants have very much the appearance of a *Pandanus*. I thought at first that there were two species concerned; but we met with such numerous gradations that I concluded there was but one sort. The flowers are bright pale yellow. I send you a rough sketch of one of the oldest-looking specimens we saw. There were none near the coast, but great numbers from fifty to sixty miles inland, in the higher country. I should judge about 30 feet to be the greatest height, and a little over 12 feet the greatest girth of stem, of the finest Kokerbooms we saw. There were many dead and prostrate ones of about that size, which seems to indicate it as their maximum stature.—ROLAND TRIMEN. *in litt.*

Botanical News.

ARTICLES IN JOURNALS.

Flora (September).—O. Brefeld, "*Mucor racemosus* and Yeast."—C. Haussknecht, "On Species of *Fumaria* sect. *Sphærocarpus*, DC." (*F. cilicica*, n.s., *F. Boissieri*, n.s.).

OCTOBER.

Grevillea.—M. J. Berkeley, "Notices of North American Fungi" (contd.).—M. C. Cooke, "Classification of *Sphæriacei*."

Quart. Journ. Microsc. Science.—W. Archer, "Resumé of Recent Observations on Parasitic Algæ."—J. Lister, "Further Contributions to the Natural History of Bacteria and the Germ Theory of Fermentative Changes" (tab. 19—21).—E. R. Lankester, "On a Peach-coloured *Bacterium* (*B. rubescens*, n.s.)" (tab. 22, 23).

Journ. Linn. Soc., n. 73 (Oct. 9).—G. Dickie, "Note on the Buds Developed on Leaves of *Malaxis*."—J. C. de Mello, "On *Cissampelos Vitis* of Velloz."—C. B. Clarke, "On a New Genus of *Hydrocharideæ*" (*Hydrotrophus*, tab. 1).—A. Gray, "Revision of the Genus *Symphoricarpus*."—J. G. Baker, "Recent Synonyms of Brazilian Ferns."—A. Gray, "Note on *Nemacladus*, Nutt."—M. J. Berkeley and C. E. Broome, "Enumeration of the Fungi of Ceylon."

Bot. Zeitung.—C. Luerssen, "On the Stomata of *Kaulfussia*."—Ib., "On the centrifugal Thickening of the Parenchyma-cells of the *Marattiaceæ*" (tab. vi.).—R. Wolff, "Contribution to Knowledge of

the *Ustilagineæ*: *Urocystis occulta*, Rab." (tab. vii.).—A. Famintzin, "On the *Myxomycetes*."

Oesterr. Bot. Zeitschr.—R. von Uechtritz, "On *Hieracium stoloniflorum*."—A. Kerner, "Distribution of Hungarian Plants" (contd.).—M. von Tommasini, "Flora of S. Istria; Supplement."—L. Celakovsky, "On the Nature of a Species, &c." (contd.).—Vatke, "On *Medicago Aschersoniana*, Urban."—H. Kemp, "Supp. to Flora of neighbourhood of Vorarlberg" (contd.).

Nuovo Giorn. Bot. Italiano.—N. Terraciano, "Enumeratio Plant. in agro Murensi sponte nasc." (concluded).—F. Cazzuoli, "Report of Experiments on Textile Fibres."—T. Caruel, "New Form of Microscope for study of Vegetable Organology" (tab. 3).—P. A. Saccardo, "New or Critical Venetian Fungi."—G. Tchistiakoff, "On the Structure and Growth of Sambul root" (tab. 4 & 5).—P. Bubani, "Notes on Willkomm and Lange's 'Prod. Flor. Hispan.'"

Hedwigia.—G. Winter, "Mycological Notes."—R. Ruthe, "*Dicranella humilis*, n.s."

New Books.—De Candolle, "Prodromus Systematis Naturalis Regni Vegetabilis," vol. xvii., concluding the work (Paris, Masson, 14fr.).—G. Bentham, "Flora Australiensis," vol. vi. (Reeve, £1 1s.).—Fries, "Icones Hymenomycetum Sueciæ nondum delin." fasc. vii. (13s.).—R. Bentley, "Manual of Botany," third edition (Churchill, 12s.).—F. Hildebrand, "Die Verbreitungsmittel der Pflanzen" (Leipzig, 4s.).

The fourth and concluding part of vol. 28 of the Transactions of the Linnean Society, just issued, contains the following botanical memoirs:—"On the Development of the Flowers of *Welwitschia*," by W. R. McNab, with a plate; "On *Begoniella*, a new genus of *Begoniaceæ* from New Grenada," by D. Oliver, with a plate; "Three New Genera in the Malayan Herbarium of the late Dr. Maingay" (*Pteleocarpa*, *Olacineæ*; *Ctenolophon*, *Olacineæ*?; *Maingaya*, *Hamamelideæ*), by D. Oliver, with three plates; "On *Alibertia*, with Description of a New Species" (*A. Melloana*, Hook. f.), by J. Correa de Mello, with a plate.

O. Nordstedt has published in the part bearing date 11th Sept. of the "Lunds Universitets Arsskrift" an extensive memoir on the *Desmideæ* of S. Norway; over 260 species are described, of which some 20 or more are new. In the same journal Nordstedt describes and figures a new species of *Spirogyra* from Scania (*S. velata*).

In the Annual Report of the Winchester and Hampshire Scientific and Literary Society, recently printed, will be found the whole of Canon Kingsley's excellent address on Bio-geology, of which we published a portion in last year's volume. The Winchester College Natural History Society has also just published its second Report, which contains a list of plants found in the neighbourhood.

The Proceedings and Transactions of the Nova Scotia Institute of Natural Science for October, 1873, contain an account of the vegetation of the Bermudas, by J. M. Jones, F.L.S. A short sketch of the physical geography of the group is followed by a catalogue of the

plants known to inhabit them, including those commonly cultivated, with their local names.

An illustrated "Guide to the Royal Botanic Garden, Edinburgh," by Prof. Balfour, has been recently published; it contains also a very brief account of the museum and herbarium, class-rooms, &c.

Prof. Lange, of Copenhagen, has published in no. 2 of the "Oversigt ov. d. K. D. Vidensk. Selsk. Forhandl." for 1873, valuable critical notes on the synonymy and characters of *Bromus asper* and *B. serotinus*, Benek., on *Ononis repens*, L., and on *Astragalus Hypoglottis*, L. The paper itself is in Danish, but has a French abstract appended, and is illustrated with two plates of *Astragali*.

The Annual Fungus Foray of the Woolhope (Hereford) Club has passed off this year with great éclat. So many as fifty-one visitors attended the club dinner on Oct. 22nd, and papers were read by Dr. Bull, Mr. Plowright, Mr. Broome, Mr. Renny, and Mr. Phillips. Excursions were made on Oct. 21st to Mynde Park and Bryngwyn, and to Moccas Park on Oct. 25th, and four species new to Britain were detected: *Hygrophorus fornicatus*, Fr., *Agaricus icterinus*, Fr., *Clavaria curta*, Fr., and *C. rufa*, Fr. In the "Graphic" for November 15th a full-page engraving commemorating some of the incidents of the day, and including portraits of a few of the most active mycologists, is given, from the pencil of Mr. W. G. Smith.

The University of Glasgow has conferred the honorary degree of LL.D. upon Dr. Hooker, Director of the Royal Gardens, Kew. This recognition of his eminent services to science comes most appropriately from the University where for twenty years his father, Sir (then Dr.) W. J. Hooker, was Professor of Botany, and of which he is himself one of the most distinguished graduates.

A Natural History and Field Club has been formed in connection with the Working Men's College in Great Ormond Street, in the museum of which institution the meetings of the club are held. During the period since its formation in June last fourteen lectures and papers have been read, and thirteen field-days, in which the Botany and Geology of Epping Forest, Croydon, and other places have been investigated, organised. The society is fortunate in possessing as president Prof. Flower, of the College of Surgeons; the hon. sec. is Mr. J. Fotheringham.

The Linnean Society held its first meeting in the apartments provided for it by Government in the new Burlington House on Nov. 6. These occupy the west side of the Piccadilly front, and consist of a meeting-room on the ground floor, and a committee-room and library with two galleries on the first floor; besides other offices, quarters for the librarian, &c. A vote of thanks to the Government for the gift was carried.

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ERRATA AND CORRIGENDA.

Page 2, line 27, *for Savoy read Carinthia*. P. 31, l. 26, *for Planon read Planchon*. P. 75, l. 14, *for superante read separante*. P. 77, l. 4 from bottom, *for Clematatis read Clematitis*. P. 117, l. 29, *for 8 read 7*. P. 122, l. 26, *for Nemocladus read Nemacladus*. P. 124, l. 2 from bottom, *for case read cone*. P. 127, l. 4, *for distinctions read distichous*. P. 158, l. 6 from bottom, *for Moekten read Insecten*. P. 158, l. 3 from bottom, *for Hieronynmus read Hieronymus*. P. 174, l. 2 from bottom, *for Duler read Euler*. P. 179, l. 26, *for position read portion*. P. 207, l. 21, *for H. F. read T*. P. 227, l. 12 from bottom, *for above read underneath*; l. 10 from bottom, omit "somewhat higher up in the beds and". P. 228, l. 5, omit "down." P. 276, l. 9, *for circle read zone*. P. 277, l. 3, *for central read new*. P. 278, l. 22 from bottom, *for vascular read areolar*. P. 280, l. 20, *for hypocotyledonary read hypercotyledonary*. P. 281, l. 4 from bottom, *for Botanicum read Botanicus*. P. 286, l. 23, *for Callas read Callao*. P. 287, transpose lines 24 and 25. P. 287, l. 34, *for Schuendener read Schwendener*. P. 341, l. 11 from bottom, Prof. Gulliver's paper is *not yet published*.

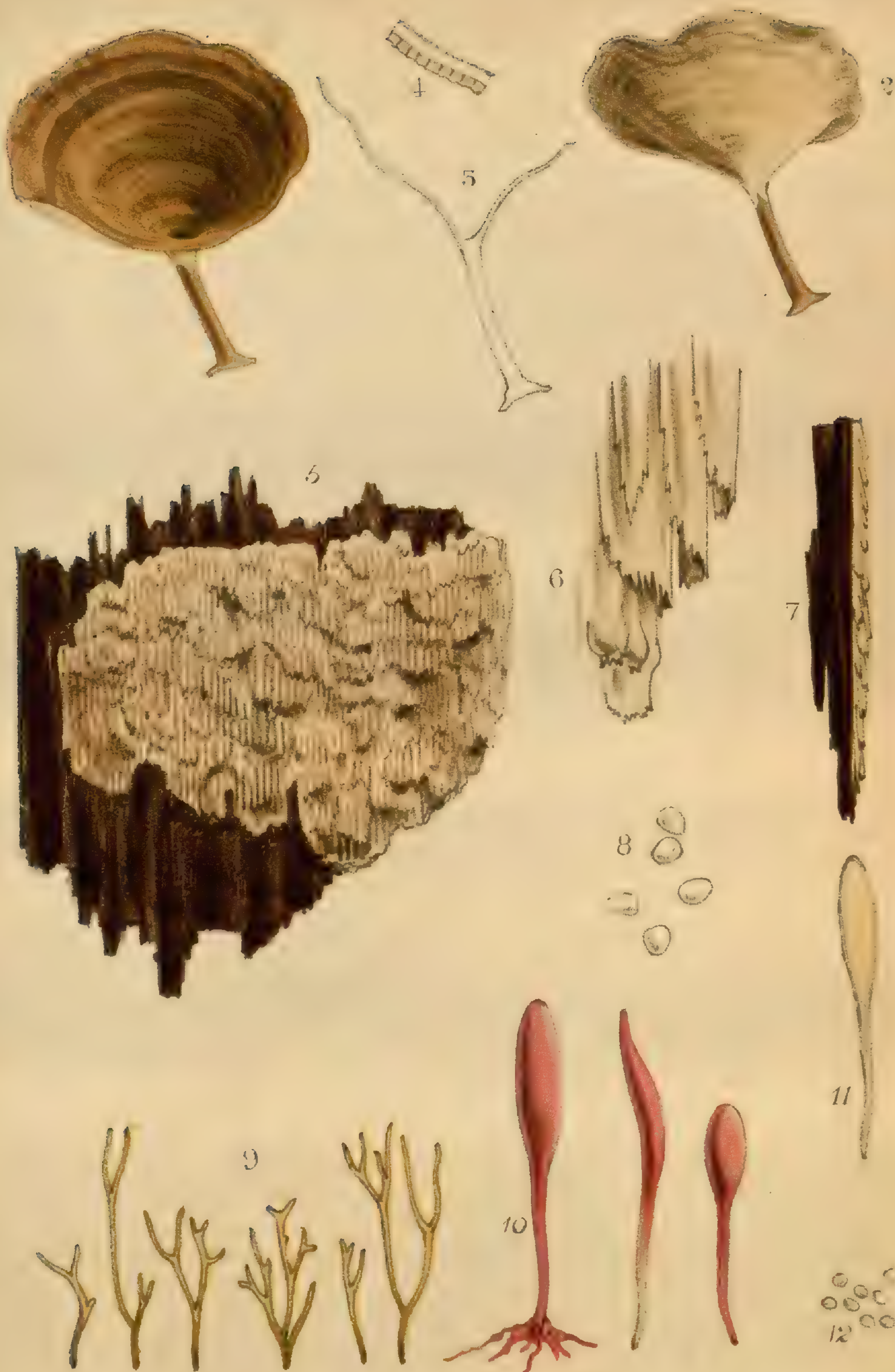




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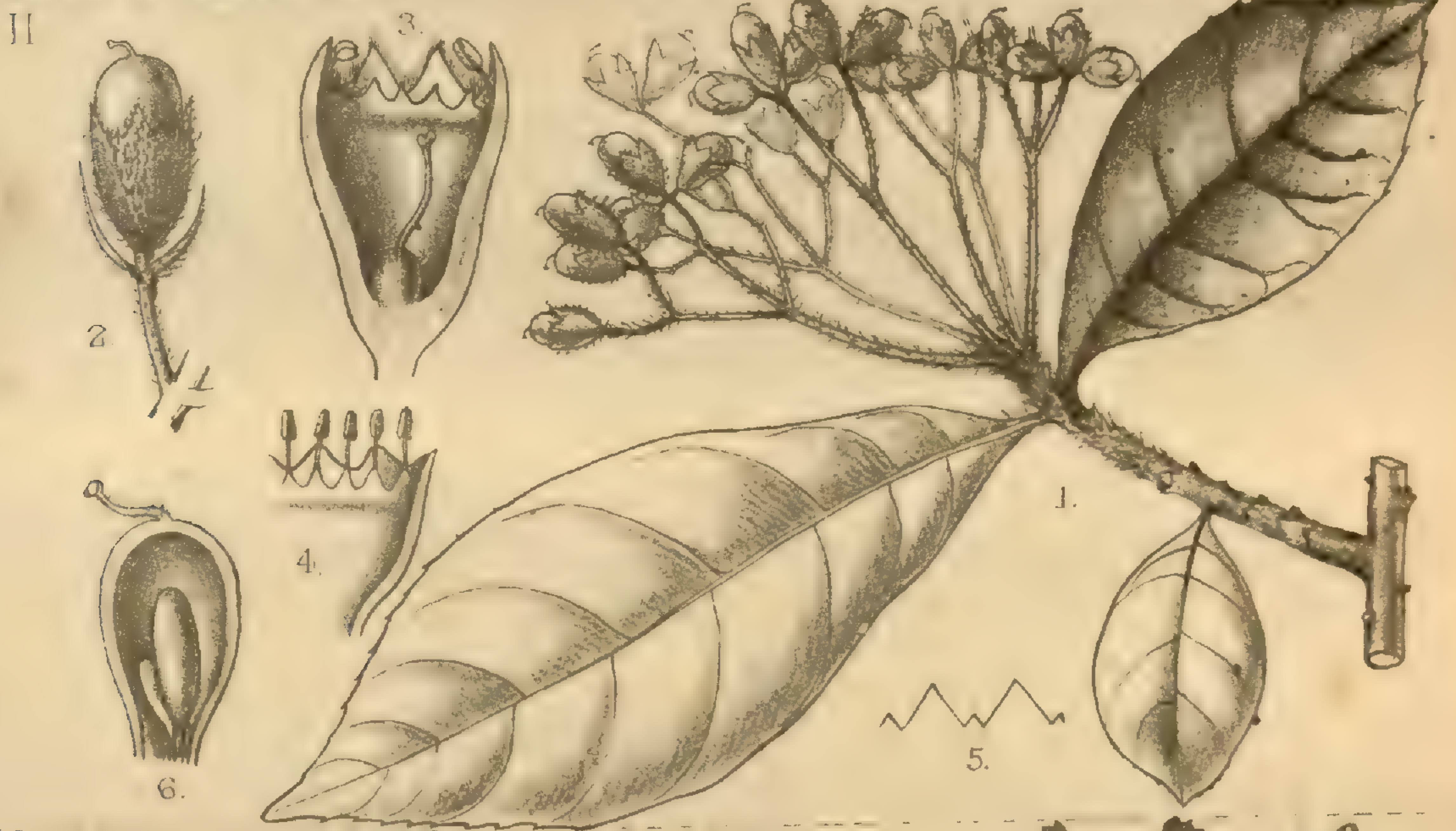
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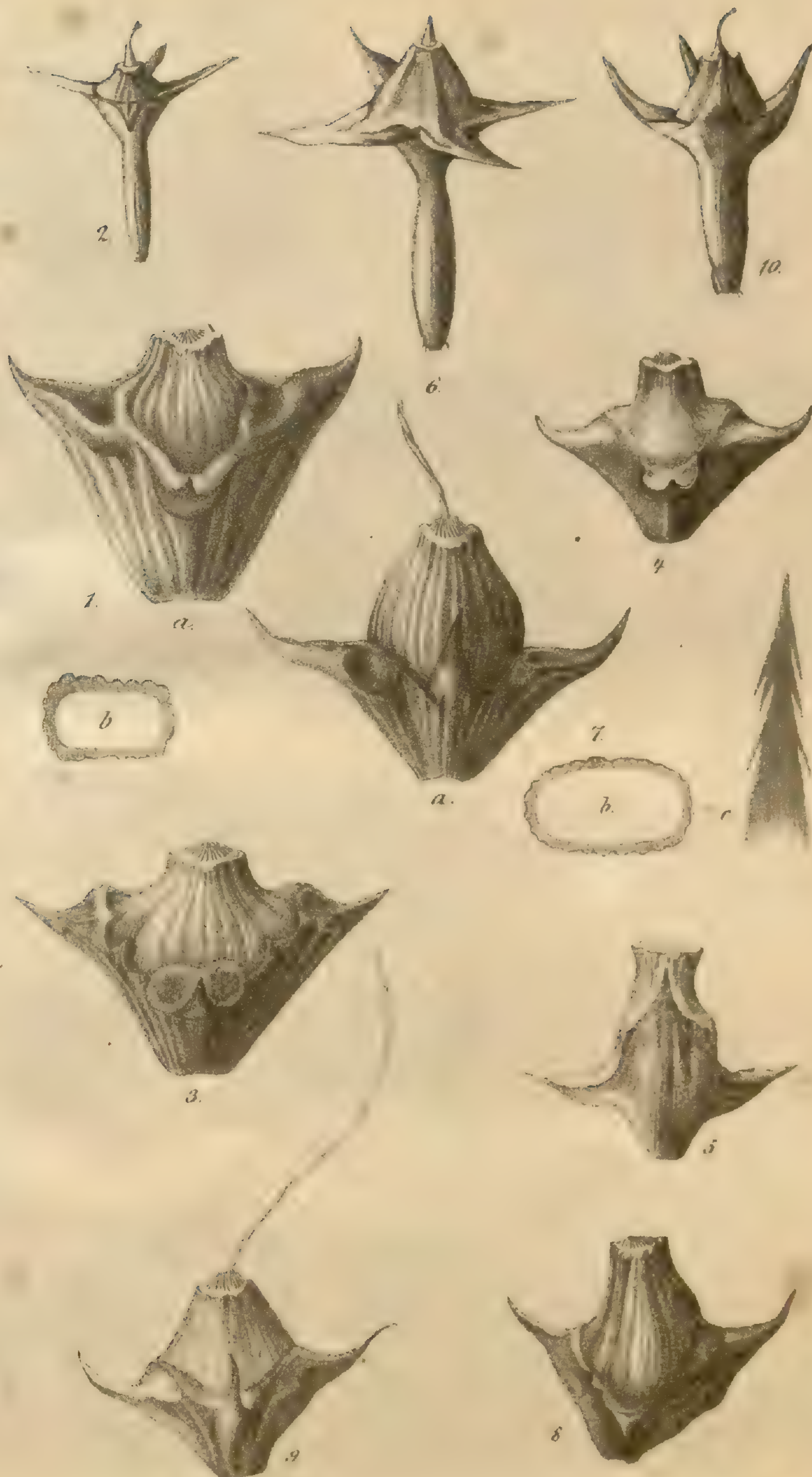


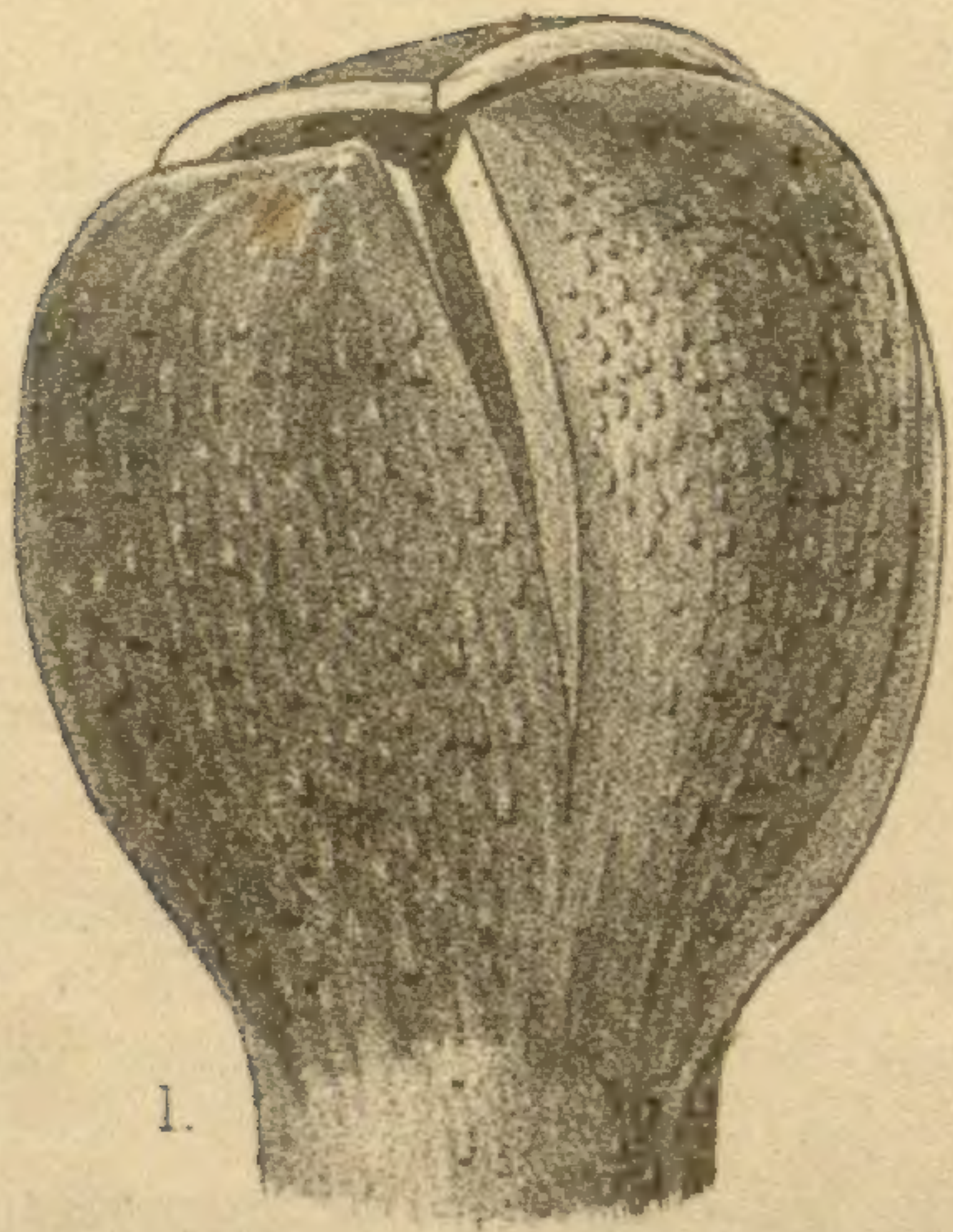
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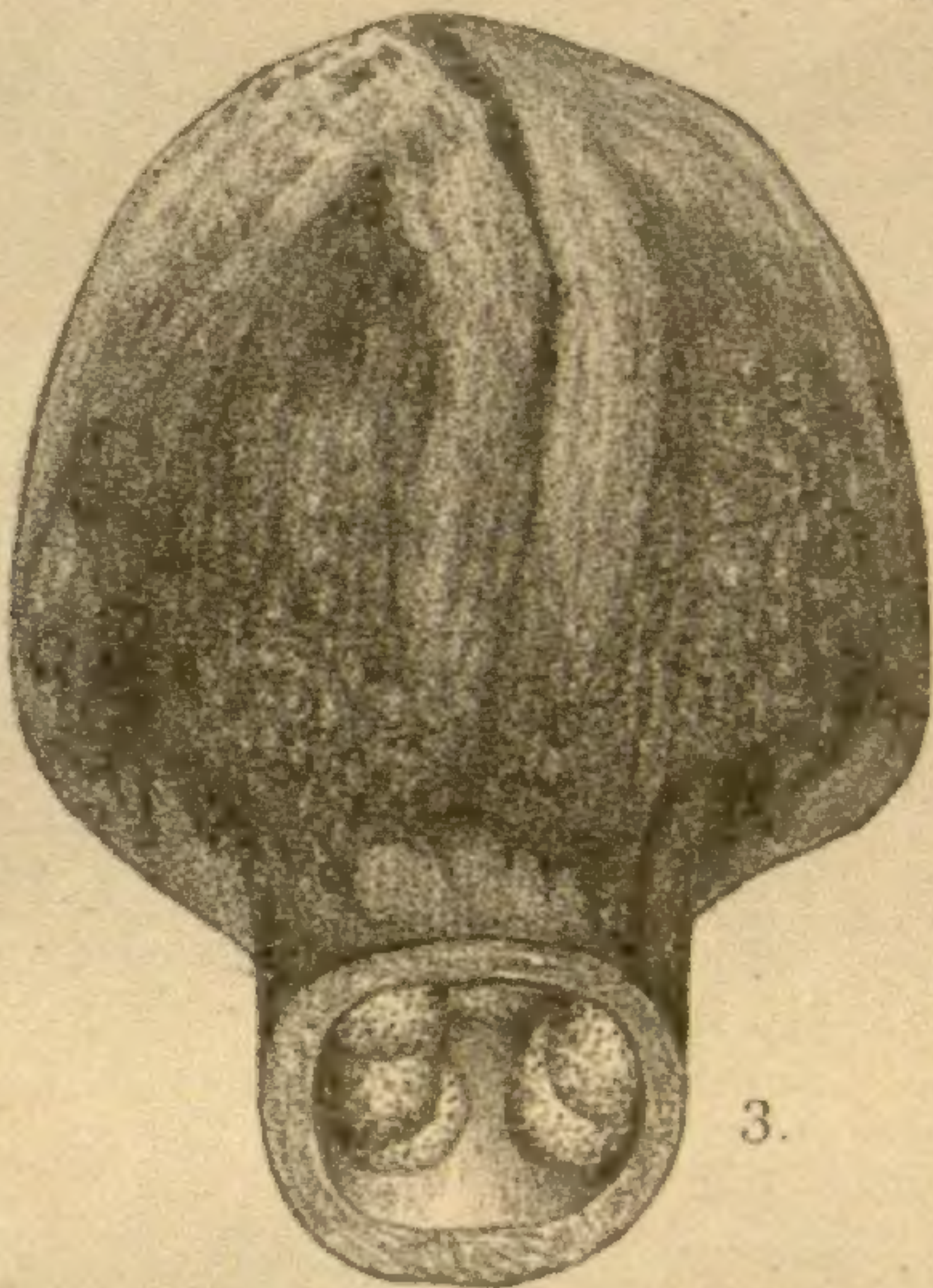




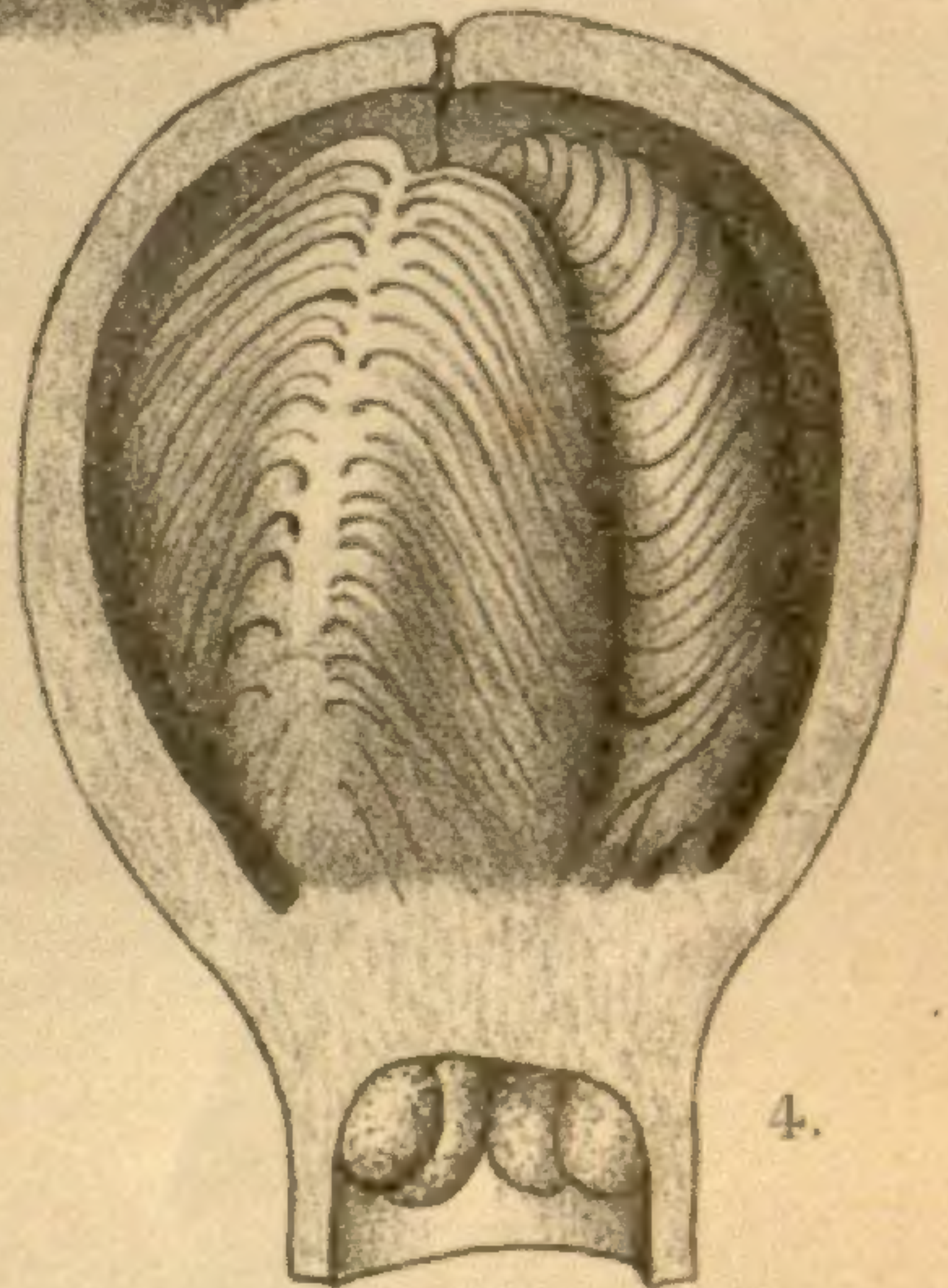
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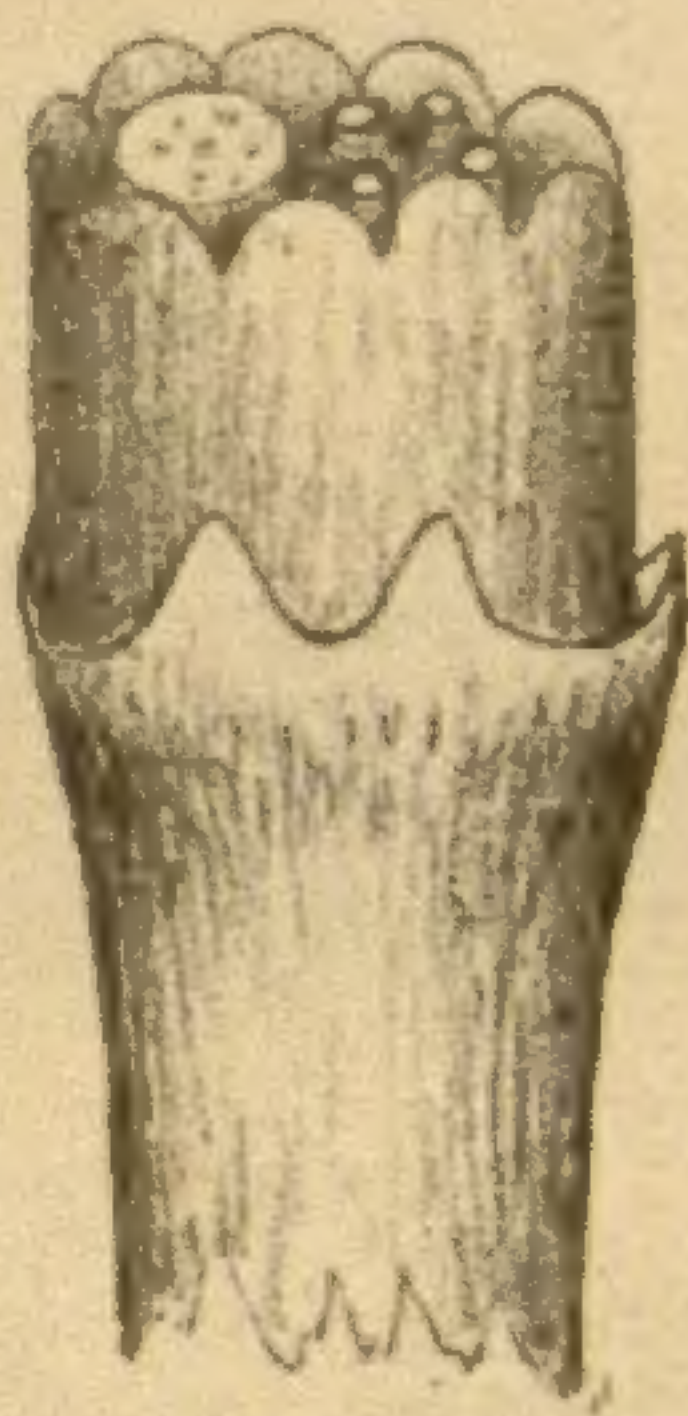


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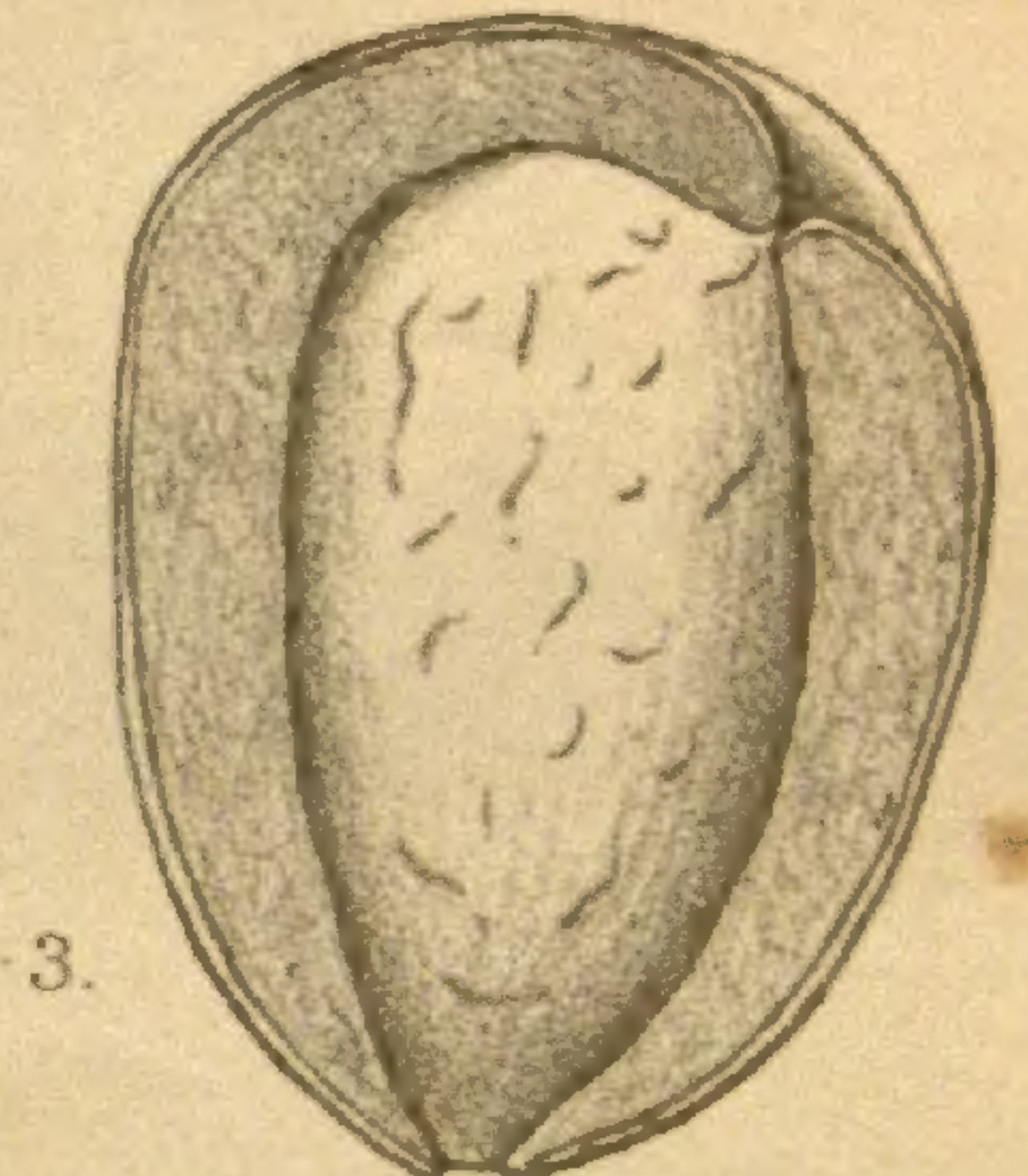
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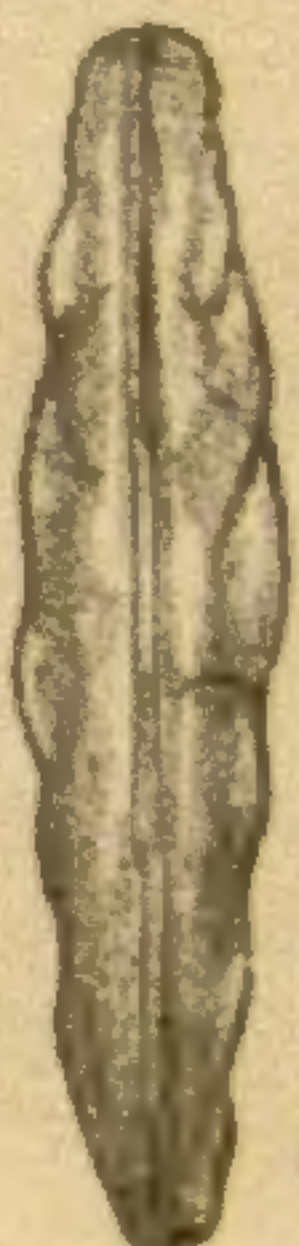
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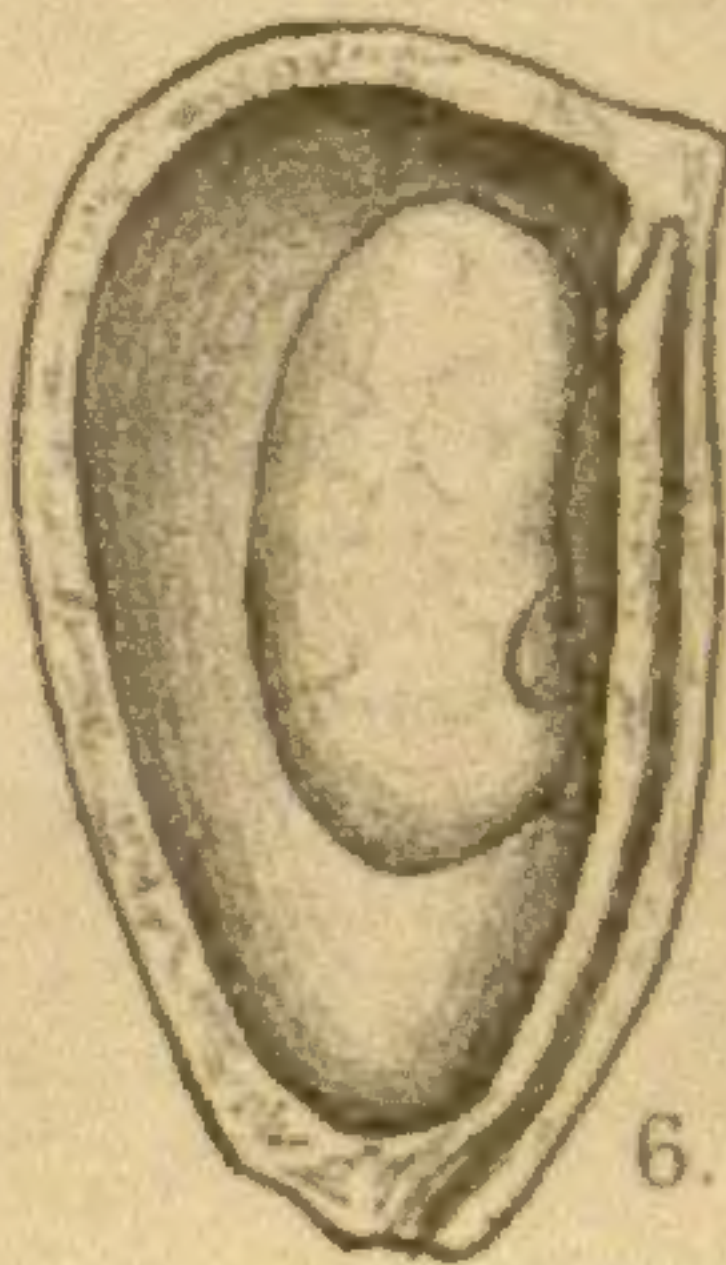
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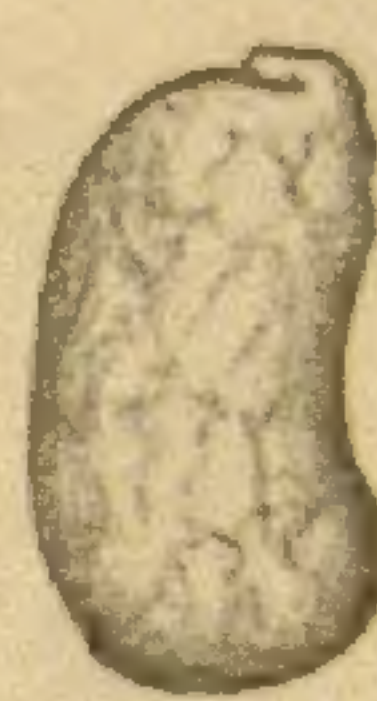
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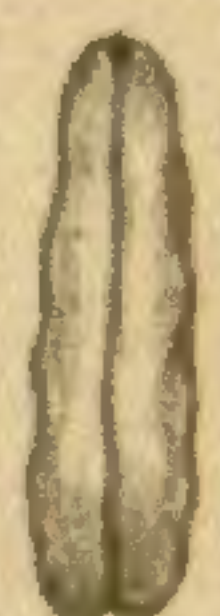
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